



October 21, 2021

Inter-American Commission on Human Rights
1889 F Street, N.W.
Washington, D.C. 20006

RE: Case No. 14.544, *Navajo Communities of Crownpoint and Churchrock v. United States of America*; Petitioners' Additional Observations on the Merits.

Dear Honorable Commissioners:

Please find enclosed a copy of Eastern Navajo Diné Against Uranium Mining's and individual Petitioners' Additional Observations on the Merits in the above matter.

The New Mexico Environmental Law Center is the Petitioners' legal representative for this proceeding. Please direct any correspondence to Eric Jantz at the address below or via email at ejantz@nmelc.org.

Thank you for your attention to this matter, and please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Eric Jantz', with a long horizontal flourish extending to the right.

Eric Jantz
Senior Staff Attorney

***PETITIONERS' ADDITIONAL OBSERVATIONS
REGARDING THE MERITS
THAT PERTAIN TO THE UNITED STATES GOVERNMENT'S FAILURE
TO PROTECT THE HUMAN RIGHTS OF THE RESIDENTS OF
CROWNPOINT AND CHURCKROCK, NAVAJO NATION, NEW
MEXICO, UNITED STATES OF AMERICA***

Case No. 14.544

Submitted to:

The Inter-American Commission on Human Rights

1889 F Street, N.W.

Washington, D.C. 20006-4400

U.S.A.

On behalf of Petitioners:

Eastern Navajo Diné Against Uranium Mining

Mitchell Capitan

Rita Capitan

Christine Smith

Keithlynn Smith

Kenneth Smith

Larry King

Submitted by Petitioners' Representatives:

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I. INTRODUCTION

Pursuant to Article 37 of the Inter-American Commission on Human Rights' ("Commission") Rules of Procedure, Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and individual Petitioners Mitchell Capitan, Rita Capitan, Christine Smith, Keithlynn Smith, Kenneth Smith, and Larry King (collectively, "Petitioners") respectfully submit the following additional observations regarding the merits in this matter.¹

When the United States, through the administrative agency the United States Nuclear Regulatory Commission ("NRC"), approved Hydro Resources, Inc.'s² license to mine uranium using the *in situ* leach ("ISL")³ method in 1998, it violated Petitioners' human rights guaranteed by the American Declaration of the Rights and Duties of Man ("American Declaration"). While the State cloaks its violations of human rights law in

¹ The Commission determined that Petitioners' allegations of human rights violations were admissible with respect to Article I (right to life), XI (right to health), XIII (right to benefits of culture), XVIII (right to fair trial) and XXIII (right to property) in Report 67/21 (March 28, 2021).

² Hydro Resources, Inc.'s ("HRI") parent company sold HRI to a Canadian mining company, Laramide Resources, LLC ("Laramide") in 2015 and changed its name to NuFuels in 2017. *See*, Letter from Michael Norato to Christopher Jones, NRC approval of indirect transfer of control of SUA-1580 from Uranium Resources, Inc. to Laramide Resources, LLC (March 11, 2016), NRC Accession No. ML16029A470; Letter from Bill von Till to Marc Henderson, NRC approval of name change from HRI to NuFuels (July 16, 2018), NRC Accession No. ML18155A201. Petitioners will refer to the mining company as HRI/NuFuels in their additional observations on the merits.

³ The uranium mining industry and NRC have "re-branded" ISL mining as *in situ* recovery ("ISR"). Petitioners will continue to refer to ISL mining as *in situ* leach because: 1) that term more accurately describes the process of leaching uranium from surrounding sand or dirt particles; and 2) Petitioners' position is that uranium does not need to be "recovered" from an aquifer, i.e., uranium in an aquifer is best left in its natural state. ISL mining is also sometimes referred to as solution mining.

technocratic doublespeak, the facts supporting Petitioners' allegations can be summed up quite simply. First, the NRC licensed an ISL uranium mine it knows will contaminate groundwater that is important as a source of drinking water and as a source of cultural identity. Second, the NRC licensed this mine in communities that already suffer increased risk of disease and death from historic uranium mining and milling that the United States not only tolerated, but actively promoted. As Petitioners demonstrate in their additional observations regarding the merits, below, the United States' ongoing neglect and discrimination against two Indigenous communities affirmatively deprives Petitioners – and their communities – of the most basic conditions needed to live a dignified life as guaranteed under the American Declaration.

The NRC licensed the proposed ISL mine in 1998 despite conceding that no commercial ISL mine in the country had, at the time the NRC issued the license,⁴ restored groundwater to pre-mining conditions. The NRC also readily admitted that HRI had not demonstrated that it could restore groundwater to pre-mining conditions at its proposed mines in Crownpoint and Churchrock. Despite the certainty that once HRI/NuFuels contaminated groundwater within the Crownpoint and Churchrock communities that groundwater would remain forever contaminated and the contaminated groundwater

⁴ Since the NRC licensed HRI/NuFuels' ISL mine in 1998, the ISL uranium mining industry's record has remained consistent – to the present day, no commercial ISL mine has been able to restore groundwater to pre-mining conditions. *See*, Declaration of Dr. Richard Abitz at 3 (Oct. 9, 2021) ("2021 Abitz Declaration") appended as Attachment A.

would undoubtedly spread throughout large areas of good quality water, the NRC nevertheless pronounced HRI/NuFuels' proposed mine "safe."⁵

Further, the NRC licensed the HRI/NuFuels' uranium operation in communities that already bear a disproportionate burden of environmental harm that are a direct result of the United States' policies promoting uranium development and ignoring uranium mining and milling waste cleanup.⁶ Despite knowing that the proposed ISL mine will increase the risk for disease and death in communities that already suffer higher risks of certain diseases because of unremediated or improperly remediated uranium mining and milling waste, the NRC licensed HRI/NuFuels' operation.⁷

Finally, the NRC's decision to license HRI/NuFuels' ISL mine continues an ongoing, albeit unofficial, policy of ethnocide against Native Americans in the United States. As Petitioners demonstrate, water, land and place are essential parts of their identity as Diné.⁸ The NRC failed entirely to acknowledge - much less accommodate or respect - Petitioners' cultural beliefs, practices and expressions when licensing the HRI/NuFuels mine.

⁵ See, e.g., *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML, LBP-99-30, 50 N.R.C 77, 109 (1999) (finding the risk of groundwater contamination at Churchrock is "minimal").

⁶ See, e.g., *El Paso Natural Gas Co., LLC v. United States*, 390 F.Supp. 3d 1025 (D. Az., 2019) (United States liable for 35% of cleanup costs of uranium mines left unremediated for 30 years because the U.S. was the primary buyer of uranium and promoter of uranium mining until 1971).

⁷ *Id.* at 119 (finding that the "small" incremental impacts of HRI's proposed ISL mine were "acceptable").

⁸ The Navajo people refer to themselves as the Diné. See, Petition 654-11, *Navajo Communities of Crownpoint and Churchrock v. United States* at 1, fn. 1 (May 13, 2011) ("Petition").

There is no construction of the facts under which the United States can claim it has provided the conditions, as required under the American Declaration, for Petitioners or their communities to live with dignity. Petitioners urge the Commission to find that the United States violated their human rights guaranteed under the American Declaration and grant the relief requested in these Additional Observations on the Merits.

II. PETITIONERS

Since the Petitioners filed their Petition, some of their circumstances have changed. Petitioner Keithlynn Smith has moved from her mother's, Petitioner Christine Smith's, residence to another residence located in the community of Crownpoint, where she is raising her children. Petitioner Kenneth Smith has moved from his mother's, Christine Smith's, residence to Gallup, New Mexico, approximately 61 miles west of Crownpoint. However, Mr. Smith regularly visits and stays with his mother in Crownpoint. Finally, Mr. Jonathan Perry is the current Executive Director of ENDAUM. Mr. Perry became ENDAUM's Executive Director in 2019.⁹ Mr. Perry is a member of the Navajo Nation and resides in Becenti, Navajo Nation, New Mexico, approximately ten miles north of Crownpoint.¹⁰

⁹ Written Testimony of Jonathan Perry at ¶ 6 (Oct. 14, 2021) ("Perry Testimony"), appended as Attachment B.

¹⁰ Perry Testimony at ¶ 3.

The demographics of Crownpoint and Churchrock have also slightly changed. The most recent data indicate that Crownpoint has a population of 2,419, approximately 90.66% of whom are Native American.¹¹ The overall poverty rate in Crownpoint is 30.93%,¹² which is almost three times higher than the official U.S. poverty rate in 2020.¹³ The most recent data indicate that Churchrock has a population of 1,128, 90.2% of whom are Native American.¹⁴ The overall poverty rate in Churchrock is 23.1%,¹⁵ which is more than twice the official U.S. poverty rate.

III. HUMAN RIGHTS VIOLATIONS

The United States holds itself out to the world as a champion of human rights. However, in its treatment of Indigenous peoples within its territory, the United States falls far short of providing even the most basic conditions for Indigenous peoples to pursue a life of dignity guaranteed by international standards. The United States has fundamentally ignored its special obligation, under the American Declaration, to the communities of Crownpoint and Churchrock to ensure their rights to life, health, cultural expression, property and fair trial.

¹¹ See, <https://worldpopulationreview.com/us-cities/crownpoint-nm-population>.

¹² *Id.*

¹³ See, <https://www.census.gov/library/publications/2021/demo/p60-273.html>.

¹⁴ See, <http://www.city-data.com/city/Church-Rock-New-Mexico.html>.

¹⁵ *Id.*

A. Sources of the State's Human Rights Obligations and General Obligations Under International Law.

The American Declaration constitutes a source of international legal obligation for all member states of the Organization of American States.¹⁶ The United States is a member of the Organization of American States.¹⁷ Further, the American Declaration may be interpreted and applied by drawing from the provisions of other prevailing international and human rights instruments, including the American Convention on Human Rights, which may be considered to represent an authoritative expression of the fundamental principles set forth in the American Declaration.¹⁸ Additionally, the American Declaration should be interpreted and applied in context of developments in the field of international human rights law.¹⁹ A states' obligations under international human rights law are distinct from and in addition to its obligations under its own domestic laws.²⁰

¹⁶ Inter-American Commission on Human Rights, Report No. 40/04, *Maya Indigenous Communities of the Toledo District Belize* at ¶ 85 (Oct. 12, 2004).

¹⁷ See, http://www.oas.org/en/sla/dil/inter_american_treaties_A-41_charter_OAS_signatories.asp.

¹⁸ *Maya Indigenous Communities of the Toledo District Belize* at ¶ 87.

¹⁹ *Maya Indigenous Communities of the Toledo District Belize* at ¶ 86.

²⁰ Inter-American Commission on Human Rights, Report No. 67/21, *Navajo Communities of Crownpoint and Churchrock v. United States* at ¶ 19 (Admissibility) (March 28, 2021); *Maya Indigenous Communities of the Toledo District Belize* at ¶ 117.

Moreover, a state's human rights obligations to Indigenous peoples require special considerations. Evolving international norms and principles encompass distinct human rights considerations relating to the ownership, use and occupation by Indigenous peoples of their traditional lands.²¹ Central to the norms and principles guiding states' treatment of Indigenous peoples is a recognition that ensuring the full and effective enjoyment of human rights by Indigenous peoples requires consideration of their particular historical, cultural, social and economic situation and experience.²² The Commission has recognized and applied states' sacred commitment to special protection of Indigenous peoples in the context of protecting the rights to life and property under the American Declaration.²³ The Commission and other international authorities have recognized the collective aspect of Indigenous rights.²⁴ The recognition of collective rights extends to acknowledgement of a particular connection between Indigenous peoples and the lands and resources that they have traditionally occupied and used, the preservation of which is fundamental to the effective realization of the human rights of Indigenous peoples.²⁵ The relationship of Indigenous peoples with the land is not merely

²¹ Inter-American Commission on Human Rights, Report No. 75/02, *Mary and Carrie Dann v. United States* at ¶¶ 96, 124 (Dec. 27, 2002).

²² *Id.* at ¶ 125.

²³ *Id.* at ¶ 126.

²⁴ *Id.* at ¶ 128.

²⁵ *Id.*

a question of possession and production, but has a material and spiritual element that must be fully enjoyed to preserve their cultural legacy and pass it on to future generations.²⁶

B. The United States has Deprived Petitioners of their Right to Life as Guaranteed by the American Declaration.

1. *Legal Standards Governing the Right to Life.*

Article I of the American Declaration guarantees the most fundamental of human rights – the right to life. Article I guarantees that “[e]very human being has the right to life, liberty and security of his person.”

The right to life has been given broad recognition as the supreme human right and as a precondition for the enjoyment of all other rights.²⁷ This human right has also been interpreted to include the right to a clean and healthy environment. In its 1997 Report on the Situation of Human Rights in Ecuador, the Inter-American Commission stated:

Respect for the inherent dignity of the person is the principle which underlies the fundamental protections of the right to life and the preservation of physical being. Conditions of severe environmental pollution, which may cause serious physical illness, impairment and suffering on the part of the local populace, are inconsistent with the right to be respected as a human being.

...

²⁶ *Id.*

²⁷ Inter-American Commission on Human Rights, Report No. 211/20, *Lezmond Mitchell v. United States of America* at ¶ 72 (Aug. 24, 2020).

The norms of the Inter-American System of Human Rights neither prevent nor discourage development; rather, they require that development take place under conditions that respect and ensure the human rights of the individuals affected. As set forth in the Declaration of Principles of the Summit of the Americas: “Social progress and economic prosperity can be sustained only if our people live in a healthy environment and our ecosystems and natural resources are managed carefully and responsibly”.²⁸

The Inter-American Commission further clarified the scope of this right in its Report on the Situation of Human Rights in Paraguay. There, it noted:

The right to life is not only the negative obligation not to deprive anyone of a life arbitrarily, but also the positive obligation to take all necessary measures to secure that that basic right is not violated.

...

We believe that there are distinct ways to deprive a person arbitrarily of life: when his death is provoked directly by the unlawful act of homicide, as well as **when circumstances are not avoided which will likewise lead to the death of persons.**

...

The arbitrary deprivation of life is not limited, thus, to the illicit act of homicide; **it extends itself likewise to the deprivation of the right to live with dignity.** This outlook conceptualizes the right to life as belonging, at the same time, to the domain of civil and political rights, as well as economic, social and cultural rights, thus illustrating the interrelation and indivisibility of all human rights.²⁹

²⁸ Inter-American Commission on Human Rights, *Report on the Situation of Human Rights in Ecuador*, Ch. VIII, EOA/Ser.L/V/II96, doc. 10, rev. 1 (April 24, 1997).

²⁹ Inter-American Commission on Human Rights, *Third Report on the Situation of Human Rights in Paraguay*, Ch. V, ¶ 11, OEA/Ser.L/V/II.110, Doc. 52 (March 9, 2001) (emphasis added).

Additionally, in the *Case of the Yakye Axa Indigenous Community v. Paraguay*, the Inter-American Court specifically found that Paraguay had failed to protect the petitioners' right to life under the American Convention on Human Rights by divesting them of their ancestral lands. The Inter-American Court concluded:

One of the obligations the State must inescapably undertake as guarantor, to protect and ensure the right to life, is that of generating minimum living conditions that are compatible with the dignity of the human person and of not creating conditions that hinder or impede it. In this regard, the State has the duty to take positive, concrete measures geared toward fulfillment of the right to a decent life, especially in the case of persons who are vulnerable and at risk, whose care becomes a high priority.

....

[T]his Court established that the State did not guarantee the right of the members of the Yakye Axa Community to communal property. The Court deems that this fact has had a negative effect on the right of the members of the Community to a decent life, because it has deprived them of the possibility of access to their traditional means of subsistence, as well as to use and enjoyment of the natural resources necessary to obtain clean water and to practice traditional medicine to prevent and cure illness.³⁰

Finally, the right to life in Article I should be interpreted not only in light of the foregoing decisions, but also in light of other international human rights mechanisms and norms. The American Declaration on the Rights of Indigenous Peoples ("ADRIP"), Article XIX, provides that Indigenous peoples have the right to a healthy, safe and sustainable environment, which are essential conditions for the full enjoyment

³⁰ *Case of the Yakye Axa Indigenous Community v. Paraguay* at ¶¶ 162, 168, Judgment (Merits, Reparations and Costs) (June 17, 2005).

of the right to life.³¹ Article XIX.3 of the ADRIP specifically provides that Indigenous peoples have the right to be protected from the introduction, abandonment, dispersion or deposit of any harmful substances that could adversely affect Indigenous communities, land or resources.³² Additionally, an Independent Expert on human rights and the environment, appointed by the United Nations Human Rights Council has stated that environmental degradation affects a broad range of human rights, including the right to life and health.³³

2. *Facts Supporting Petitioners' Allegations.*

In addition to the facts Petitioners presented in their Petition, which Petitioners incorporate by reference here, the following facts further support Petitioners' contentions that the United States violated Petitioners' right to life in two ways. First, the NRC has created conditions – by approving HRI/NuFuels' materials license, which it admits will likely contaminate groundwater – that will deprive Petitioners of the ability to live lives of dignity. Second, by ignoring widespread existing contamination from uranium mining in its licensing proceeding and approving a project that will add

³¹ Organization of American States, *American Declaration on the Rights of Indigenous Peoples*, AG/RES 2888 (XLVI-O/16) (June 15, 2016).

³² *Id.* at Article XIX(3).

³³ Knox, John, *Report of the Independent Expert on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment: Mapping Report* (A/HCR/25/53) at ¶¶ 17, 44 (Dec. 30, 2013).

to that contamination, the NRC is perpetuating conditions that are currently depriving Petitioners of the ability to live healthy and dignified lives.

- a. Granting HRI/NuFuels' materials license creates conditions that will result in widespread groundwater and soil contamination.

As Petitioners demonstrated in their Petition, at the time NRC issued HRI's license, it was aware that groundwater restoration to pre-mining conditions at ISL mines had never occurred.³⁴ Indeed, in the Final Environmental Impact Statement ("FEIS") for the Crownpoint Uranium Project, appended to the United States' response to the Petition, the NRC stated:

Successful restoration of a production-scale ISL well field has not previously occurred. Further, site specific tests conducted by HRI have not demonstrated that the proposed restoration standards can be achieved at a production scale.³⁵

The NRC was also aware that spills and leaks of radioactive and toxic materials at ISL sites was (and still is) a common occurrence.³⁶ Additionally, even though the United States continues to perpetuate the uranium mining industry's common assertion that groundwater targeted for ISL mining is already contaminated,³⁷ the NRC had evidence

³⁴ Petition at 26-30, 32-38.

³⁵ United States Nuclear Regulatory Commission, NUREG-1508, *Final Environmental Impact Statement to Construct and Operate the Crownpoint Uranium Solution Mining Project, Crownpoint, New Mexico* at 4-113 (Feb. 1997).

³⁶ FEIS at 4-7.

³⁷ Petition Response at 15-16.

– which it ignored – that groundwater at the proposed mine sites in Churchrock and Crownpoint is suitable for both current and future drinking water supplies.³⁸

As Figure 1, taken from ENDAUM's expert Dr. Richard Abitz's 1999 testimony before the NRC demonstrates, groundwater quality within the proposed mine areas in Crownpoint and Churchrock but outside the ore deposits, meets all the U.S.

Environmental Protection Agency's ("EPA") primary drinking water standards.

TABLE 1

Parameter	MCL ^a (mg/L)	Church Rock (mg/L)		Crownpoint (mg/L)		Teton Pilot (mg/L)
Primary Standards		non-ore zone	ore zone	non-ore zone	ore zone	restoration values
Arsenic	0.05	0.001	0.002	0.001	0.001	0.032
Barium	2	0.08	0.06	0.04	0.06	0.07
Cadmium	0.005	0.0001	0.0002	0.0001	0.0001	< 0.01
Chromium	0.1	0.01	0.01	0.01	0.01	< 0.05
Fluoride	4	0.39	0.30	0.24	0.33	0.30
Mercury	0.002	0.0001	0.0001	0.0001	0.0001	< 0.001
Nitrate (as N)	10	0.01	0.02	0.02	0.04 ^j	1.34
Selenium	0.05	0.001	0.001	0.001	0.001	0.72
²²⁶ Radium	5 ^b (pCi/L)	0.3 (pCi/L)	8.6 ^d (pCi/L)	0.5 (pCi/L)	0.7 ^k (pCi/L)	8.5 (pCi/L)
Uranium	0.044 ^c	0.002 ^e	0.303 ^f	0.001	0.006	2.7
Secondary Standards						
Chloride	250	6.1	6.0 ^g	3.5	3.2 ^l	6.0
Iron	0.3	0.03	0.04	0.04	0.05	0.67
Manganese	0.05	0.01	0.01	0.01	0.01	< 0.05
Silver	0.1	0.01	0.01	0.01	0.01	not reported
Sulfate	250	24	37 ^h	35	37	37
TDS	500	364	364 ⁱ	314	326	426

^a Maximum Contaminant Level

^b MCL is for ²²⁶Ra + ²²⁸Ra.

^c EPA promulgated UMTRA standard for uranium is 30 pCi/L, which is equivalent to 0.044 mg/L when assuming a natural distribution of uranium isotopes.

^d Outlier¹ values of 24 and 26 removed.

^e Outlier value of 0.494 removed.

^f Outlier values of 6.28, 6.66, 10.0, and 10.4 removed.

^g Outlier values of 10 and 12 removed.

^h Outlier value of 71 removed.

ⁱ Outlier values of 435 and 451 removed.

^j Outlier value of 0.26 removed.

^k Outlier value of 1.8 removed.

^l Outlier value of 15 removed.

¹ Outliers are single nonrepeating values for a well that lie outside 95 percent of the population (i.e., outside the range of \pm two standard deviations).

Figure 1.³⁹

³⁸ Navajo Tribal Utility Authority, NTUA 11-97, *Resolution of the Management Board of the Navajo Tribal Utility Authority Stating the Position of Navajo Tribal Utility Authority on Proposed Uranium Solution Mining in Eastern Navajo Agency by Hydro Resources, Inc.* (Dec. 11, 1997), appended as Attachment C.

³⁹ Written Testimony of Dr. Richard J. Abitz at 12, Table 1 (Jan. 8, 1999) ("1999 Abitz Testimony") attached as Exhibit 1 to Intervenor's Presentation on Groundwater Protection, *In the Matter of Hydro Resources, Inc.*

Fundamentally, Dr. Abitz's 1999 Testimony demonstrated that the water quality at HRI/NuFuels' proposed mine sites in both Crownpoint and Churchrock is excellent outside the small areas of the aquifer where uranium ore deposits naturally occur.

- i. HRI/NuFuels' operation will contaminate current and future drinking water supplies in Crownpoint and Churchrock after mining has concluded.

Since the Petitioners filed their Petition, the evidence indicating that HRI/NuFuels will not be able to restore groundwater to pre-mining conditions is only more convincing. As Dr. Richard J. Abitz demonstrates in his attached declaration, introducing oxidizing chemicals into an aquifer – which is the process used in ISL uranium mining – necessarily alters the aquifer geochemistry over large areas, making restoring groundwater to pre-mining conditions impossible to date.⁴⁰ Dr. Abitz's testimony clearly shows that under anoxic (low oxygen) conditions, uranium and other heavy metals are immobile, allowing good quality water to be located near undisturbed uranium ore bodies.⁴¹ However, after the introduction of the chemicals used to extract uranium in ISL mining, uranium and other heavy metals mobilize throughout large

Docket No. 40-8968-ML (Jan. 11, 1999), NRC Accession No. ML13046A325. Since Dr. Abitz submitted his testimony in 1999, the NRC amended HRI/NuFuels' license to reflect the change in the MCL for uranium to 0.03 mg/L.

⁴⁰ 2021 Abitz Declaration at 2-3. Petitioners provided a detailed description of the ISL mining process on pages 24-25 of their Petition.

⁴¹ 2021 Abitz Declaration at 3; 1999 Abitz Testimony at 9.

areas of an aquifer, increasing the concentrations of these contaminants by orders of magnitude.⁴²

Moreover, by altering the geochemistry of an aquifer through ISL mining, restoration becomes technically impossible. As Dr. Abitz testifies, there have been no successful instances of groundwater restoration at any commercial ISL uranium facilities in the United States.⁴³ Based on determining the activity ratios of uranium in groundwater, there is conclusive evidence of an ISL operation contaminating a drinking water well in Texas.⁴⁴ This discovery is particularly concerning because neither the NRC nor any states that have assumed regulatory authority for ISL mining have ever required post-mining groundwater quality monitoring for any consequential length of time, making the likelihood of undetected groundwater contamination from ISL operations high.⁴⁵

In 2005, Dr. Abitz testified that “natural attenuation,” i.e., the chemical reaction where uranium and other heavy metals re-bind to surrounding soil particles, was unlikely to occur, allowing groundwater contaminated by HRI/NuFuels’ ISL mining to

⁴² 2021 Abitz Declaration at 3.

⁴³ *Id.*

⁴⁴ *Id.* at 11.

⁴⁵ Fettus, Geoffrey and McKinzie, Matthew, *Nuclear Fuel’s Dirty Beginnings: Environmental Damage and Public Health Risks From Uranium Mining in the American West* at 42, Natural Resources Defense Council (March 2012), available at: <https://www.nrdc.org/sites/default/files/uranium-mining-report.pdf> (“NRDC Report”).

migrate beyond the mine site into uncontaminated portions of the aquifer in Crownpoint.⁴⁶ The studies Dr. Abitz cites in his current testimony vindicate his warning to the NRC.

- ii. HRI/NuFuels will contaminate current and future drinking water supplies during operations.

As Dr. Abitz further demonstrates, by changing an aquifers' geochemistry, ISL operations regularly experience intrusions of highly contaminated production water into nearby uncontaminated groundwater.⁴⁷ In his Declaration, Dr. Abitz explains that the same chemical reactions that make groundwater restoration after ISL mining completely impossible also make contamination of groundwater resources adjacent to mining operations during mining operations virtually inevitable.⁴⁸ The record of ISL mining before and since 2011 support Dr. Abitz's Declaration.

Although too numerous to list in their entirety, recorded incidences of highly contaminated mine water migrating to adjacent groundwater resources (called "excursions") include:

⁴⁶ Declaration of Dr. Richard J. Abitz at ¶¶ 44, 57 (March 3, 2005) ("2005 Abitz Declaration") attached as Exhibit N to Intervenor's Presentation on Groundwater Protection, Groundwater Restoration and Surety Estimates, *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML (March 7, 2005), NRC Accession No. ML050700148.

⁴⁷ 2021 Abitz Declaration at 6-9.

⁴⁸ *Id.* at 3.

- 1998 – Friends of the Earth issued a report documenting widespread excursions in Texas and Wyoming ISL mines in the 1970s and 1980s;⁴⁹
- January 23, 2009 – the state of Wyoming Department of Environmental Quality (“DEQ”) issued a Notice of Violation (“NOV”) to Cameco Resources for an excursion discovered in September 2008 at its Smith Ranch – Highland ISL mine;⁵⁰
- December 8, 2009 - the state of Wyoming DEQ issued a NOV to Power Resources, Inc. (owned by Cameco Resources) for failing to report an excursion at its Highland Uranium ISL facility;⁵¹
- March 8, 2010 – Wyoming DEQ sent a letter to Uranium One regarding an excursion at its Irigaray-Christensen Ranch ISL mine that had been ongoing since July, 2004;⁵²
- 2013 – paper published in the Austin Geological Society Bulletin noted that *at least* 21 excursions occurred in a single production area at Uranium Resources, Inc.’s (now enCore Energy) Kingsville Dome ISL mine in Texas;⁵³
- September 1, 2015 – Letter from Ur-Energy to NRC reporting excursion discovered in May, 2015 at its Lost Creek ISL mine.⁵⁴

The ISL industry’s inability to contain contaminated groundwater within mine

boundaries, both during and after mining creates exposure pathways, i.e., means by

⁴⁹ Mudd, Gavin, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining* at 54-67 (Friends of the Earth, 1998).

⁵⁰ https://drive.google.com/file/d/1Eu3awGJ275pYeO43Ms2Ei1eUniI_lfsI/view

⁵¹ <https://drive.google.com/file/d/1Fz0w0fl-Y-DQi23px-8uugeUdFBTCTcQ/view>

⁵² <http://s3.documentcloud.org/documents/549660/2010-warning-letter-axex-good-source-ml100840667.pdf>

⁵³ Rice, George, *Excursions of Mining Solution at the Kingsville Dome In-Situ Leach Uranium Mine*, 9 Austin Geological Society Bulletin 18, 27 (2013); available at <http://static1.squarespace.com/static/56e481e827d4bdfdac7f8e0f/t/56f87e264c2f85720ce5e512/1459125809672/Rice,+2013,+Excursions+of+mine+solution+at+the+kingsville+dome+in-situ+leach+uranium+mine.pdf>

⁵⁴ <https://www.nrc.gov/docs/ML1525/ML15254A284.pdf>

which humans may be exposed to contaminants, which the NRC has failed to address or even acknowledge. The NRC's failure to address these exposure pathways greatly increases the risk that Petitioners and other residents of Crownpoint and Churchrock will be exposed to high concentrations of uranium and other heavy metals through ingesting water, thus increasing the risk of morbidity and mortality.

This risk is particularly acute given Petitioners' reliance on groundwater as a drinking water source and their communities' reliance on groundwater as a drinking water source. As Jonathan Perry testifies, the Becenti Chapter, just north of Crownpoint, has thirteen windmills that pump groundwater for human consumption.⁵⁵ Additionally, Becenti Chapter, Crownpoint Chapter and other surrounding Navajo Nation chapters rely on the Westwater Canyon Aquifer (the aquifer HRI/NuFuels has identified for mining) for human consumption.⁵⁶

- iii. HRI/NuFuels will likely contaminate surface soils during operations.

In addition to their significant impacts on groundwater, ISL operations also have substantial impacts on surface soils. The ISL industry's record of surface spills and leaks indicate that when it licensed HRI/NuFuels' operations in Crownpoint and

⁵⁵ Perry Testimony at ¶ 25.

⁵⁶ Perry Testimony at ¶ 25; Written Testimony of Rita Capitan at ¶¶ 30-31 (Oct. 18, 2021), appended as Attachment D ("Rita Capitan Testimony"); Written Testimony of Mitchell Capitan at ¶¶ 37-39 (Oct. 18, 2021), appended at Attachment E ("Mitchell Capitan Testimony").

Churchrock, the NRC knew, or should have known, that spills and leaks are routine and would lead to soil contamination.

Again, listing all occurrences of spills and leaks at ISL mines would be a significant undertaking. However, some of the more egregious examples include:

- September 12, 2007 – Wyoming DEQ issued a NOV to Power Resources, Inc. for a spill of 198,000 gallons of injection fluids at its Highland ISL mine;⁵⁷
- November 21, 2007 – Wyoming DEQ issued an inspection report for Power Resources, Inc.’s Highland and Smith Ranch ISL mines noting that the ISL mines have an “inordinate” number of spills, with 80 spills being reported over the years. Wyoming DEQ noted that such occurrences had become “routine”;⁵⁸
- November 28, 2007 – Wyoming DEQ issued a NOV to Power Resources, Inc. for an underground spill of 11,600 gallons of contaminated water, with 7,500 gallons reaching the surface at its Smith Ranch ISL mine;⁵⁹
- May 23, 2008 – a Nebraska district court issued a consent decree awarding penalties to the Nebraska DEQ for Crow Butte Resources, Inc.’s release of mine water onto the surface of its Crow Butte ISL mine;⁶⁰
- November 1, 2016 – Wyoming DEQ issued an NOV to Strata Energy, Inc. for contaminating soil to be used for mine surface reclamation;⁶¹
- August 25, 2017 – Ur-Energy submitted a letter to Wyoming DEQ and NRC reporting a spill of 188,000 gallons of uranium saturated solution at its Lost Creek ISL project.⁶²

⁵⁷ <https://drive.google.com/file/d/15XNNSeD6dedSzDsY5A7KI3ObW1PJkzS/view>

⁵⁸ <https://drive.google.com/file/d/1cCmXjM6emPwlnm4YrGpZU4rd6AlRelsk/view>

⁵⁹ <https://drive.google.com/file/d/1BmRdIXUZreqwCVDGN7g--3kYWnSa9Ofh/view>

⁶⁰ [http://www.deq.state.ne.us/Press.nsf/23e5e39594c064ee852564ae004fa010/766b857b318fc04f862577a40055d242/\\$FILE/Crow%20Butte%20CD.pdf](http://www.deq.state.ne.us/Press.nsf/23e5e39594c064ee852564ae004fa010/766b857b318fc04f862577a40055d242/$FILE/Crow%20Butte%20CD.pdf)

⁶¹ <https://drive.google.com/file/d/1Q9fMpJ917F4OCtsnjh2HxWfwAbaXsAo3/view>

⁶² <https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML17248A032>

Soil contamination can not only leach into groundwater, it can also contaminate surface water and can be dispersed widely through wind.⁶³ Vegetation can also become contaminated from surface leaks or spills, which may be directly consumed by humans or by livestock, which are in turn consumed by humans.⁶⁴ Thus, there are numerous pathways by which people may be exposed to radioactive and toxic heavy metals associated with ISL mining leaks and spills.

- b. The NRC issued HRI/NuFuels' license despite the fact Crownpoint and Churchrock are already overburdened by contamination from historic uranium mining.

During the NRC's licensing proceeding, Petitioners repeatedly pointed out that land and groundwater within and near Crownpoint and Churchrock had already been contaminated by historic uranium mining and milling. Petitioners also repeatedly demonstrated that this contamination resulted in Churchrock and Crownpoint residents being exposed to elevated concentrations of radiation and heavy metals.⁶⁵

⁶³ Declaration of Christopher L. Shuey at ¶¶ 12, Fig. 1, 20-21 (Oct. 19, 2021) ("Shuey Declaration"), appended as Attachment F; Declaration of Melinda Ronca-Battista at ¶ 30 (June 10, 2005) ("Ronca-Battista Declaration"), attached as Exhibit K to Intervenors' Presentation with Respect to Radiological Air Emissions for Church Rock Section 17, *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML (June 13, 2005), appended as Attachment G. Ms. Ronca-Battista's testimony does not have an NRC Accession number and is therefore appended as an attachment.

⁶⁴ Written Testimony of Christine J. Benally, Ph.D, attached as Exhibit 2 to Intervenors' Presentation with Respect to Environmental Justice Issues at 40-41 and citations listed therein, *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML, NRC Accession No. ML20203J380 ("Benally Testimony")

⁶⁵ Ronca-Battista Declaration at ¶¶ 30-36.

Further, the Petitioners submitted significant information about the health impacts that exposure to uranium mine wastes may cause.⁶⁶ The NRC nevertheless issued a license to HRI/NuFuels.

- i. The NRC's licensing decision increases the already unacceptable mortality and morbidity risks that community members face because of exposure to waste from historic uranium mining and milling.

As shown in Section III.B.2.a, above, by licensing the HRI/NuFuels project, the NRC has created increased risk for community members in Crownpoint and Churchrock to be exposed to radiation and toxic heavy metals. The public health and cultural implications of the NRC's action are amplified by the fact that areas in and near Crownpoint and particularly Churchrock, already have significant groundwater and surface contamination due to historic uranium mining and milling, which remains unremediated or inadequately remediated due to federal government inaction. As a result, people in Churchrock and Crownpoint already face an increased risk of death and disease from exposure to uranium mining and milling waste, to which the risk from the HRI/NuFuels mine would be added.

Petitioner ENDAUM presented testimony to the NRC in 1999 that clearly demonstrated that HRI/NuFuels' proposed uranium mine would have significant

⁶⁶ See, e.g., Testimony of Douglas M. Brugge, Ph.D, M.S. (Feb. 16, 1999), attached as Exhibit 3 to Intervenor's Presentation on Environmental Justice Issues *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML (Feb. 19, 1999), NRC Accession No. 20203J387.

health impacts on the Crownpoint and Churchrock communities in three ways. First, because Crownpoint and Churchrock are predominantly low-income communities of color, structural barriers to healthcare access and healthcare education increase community vulnerability to additional insults to health such as contamination from HRI/NuFuels' proposed project.⁶⁷

Second, many residents of Crownpoint and Churchrock (and the Navajo Nation as a whole) were exposed to radioactivity from their employment in the uranium mining industry.⁶⁸ These individuals therefore carry a disproportionate risk of morbidity and mortality because of their occupational exposures.⁶⁹

Finally, even when Navajo Nation community members did not receive occupational exposure to radioactivity and heavy metals, they nevertheless have an increased risk of morbidity and mortality related to radiation and heavy metal exposure because of their proximity to unreclaimed and inadequately reclaimed uranium mines.⁷⁰ As illustrated in Figure 2, thirteen unremediated or inadequately remediated uranium mines are located near the proposed HRI/NuFuels Churchrock mine sites.

⁶⁷ Shuey Declaration at ¶¶ 23-28; Written Testimony of Christine J. Benally, Ph.D, attached as Exhibit 2 to Intervenor's Presentation with Respect to Environmental Justice Issues at 19-20, *In the Matter of Hydro Resources, Inc.* Docket No. 40-8968-ML, NRC Accession No. ML20203J380 ("Benally Testimony").

⁶⁸ *Id.* at 21-23.

⁶⁹ *Id.*

⁷⁰ *Id.* at 24-43. *See also*, Written Testimony of Larry J. King at ¶ 47 (Oct. 18, 2021) ("King Testimony"), appended as Attachment H.

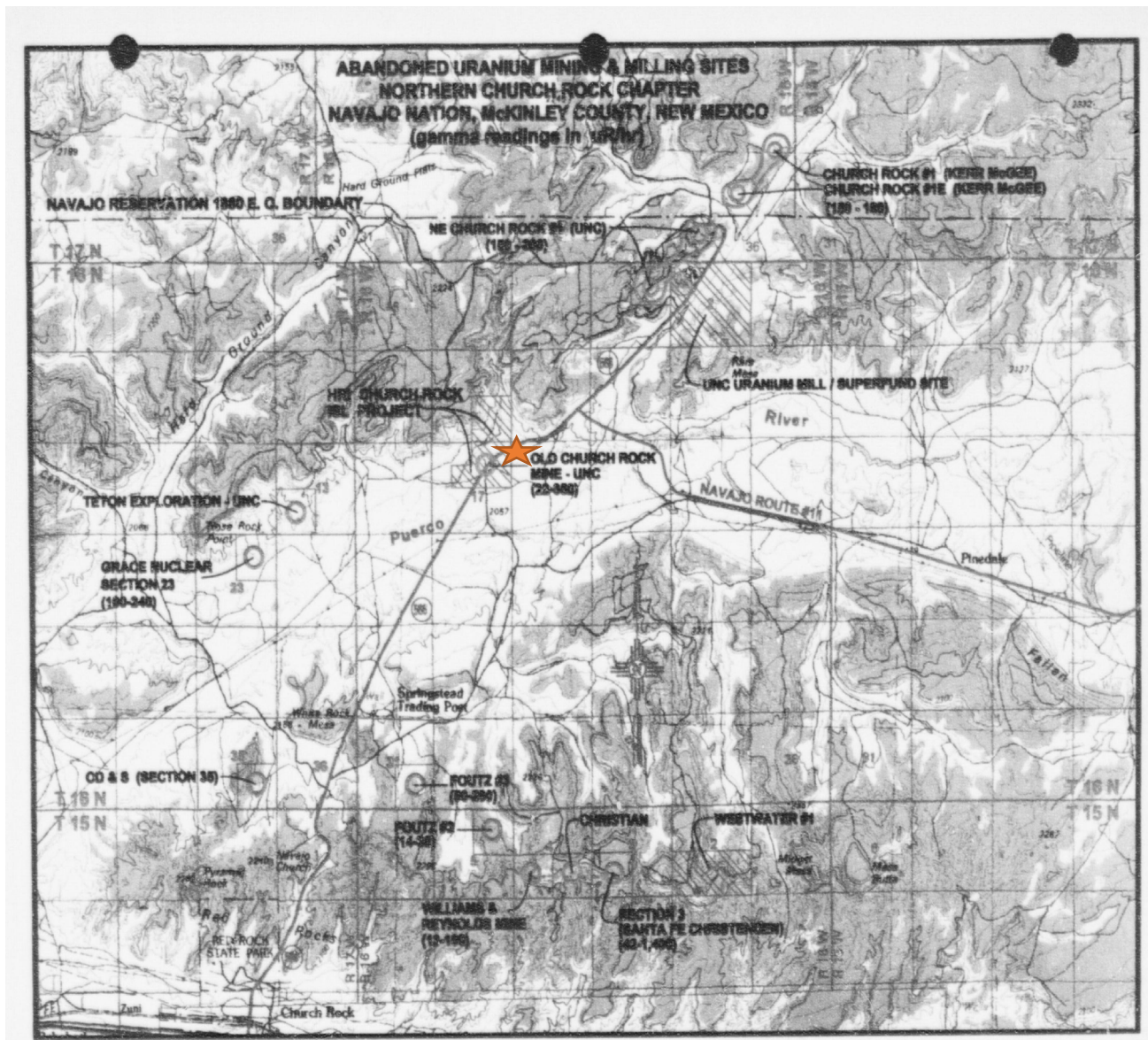


Figure 2. ⁷¹

Dr. Benally concluded that Churchrock residents were exposed to 14 times the NRC's own regulatory limits for radon exposure to the public because of unremediated historic uranium mines.⁷² In sum, Dr. Benally concluded that Churchrock Chapter

⁷¹ The star represents the approximate location of Larry King's residence.

⁷² Benally Testimony at 38.

residents are chronically exposed to high radon concentrations because of extensive, unmitigated waste from historic uranium mines and mills.⁷³

Dr. Benally's conclusions were later confirmed by community led gamma radiation surveys conducted in Churchrock in 2003.⁷⁴ These surveys detected gamma radiation concentrations on HRI/NuFuels' proposed Churchrock Section 17 site (which is also where Petitioner Larry King lives) between 5 and 16 times higher than average background gamma levels taken in areas of the Churchrock Chapter that were not impacted by historic uranium mining.⁷⁵ Thus, Petitioner Larry King and his family have been chronically exposed to elevated radiation levels due to historic mining.⁷⁶

- ii. In addition to compounding mortality and morbidity risks for Petitioners, the NRC's decision deprives Petitioners the right to live a life of dignity.

In addition to increasing the risks of physical death, the NRC's decision to grant HRI/NuFuels' license in areas that are already burdened by waste from historic uranium mining and milling deprives Petitioners of the right to live with dignity because of the cultural and psychological trauma that the State's uranium mining and milling policy has caused them. As Petitioners Rita Capitan, Christine Smith, Larry

⁷³ *Id.* at 43.

⁷⁴ Ronca-Battista Declaration at ¶¶ 12-13.

⁷⁵ *Id.* at ¶ 30.

⁷⁶ *Id.* at ¶¶ 30, 36; *see also*, Shuey Declaration at ¶¶ 25, 30.

King and Jonathan Perry testify, the NRC's decision to license a new uranium mine in their communities that are already overburdened by legacy waste diminishes them not only as individuals, but as a people.

In her testimony, Ms. Capitan describes how challenging the NRC's decision has fractured blood relationships, clan relationships, and friendships.⁷⁷ This fracturing led to her and her husband receiving death threats.⁷⁸ She also describes how the ever-present threat of new mining weighs on her.⁷⁹ Ms. Capitan testifies how the United States treats Navajo people as if they do not matter.⁸⁰ The State's failure to respect Navajo Nation law attests to this.⁸¹

Mr. King describes how uranium mines discharged mine water into a wash near his home, creating a perennial stream laden with uranium and other heavy metals for over twenty years.⁸² More alarmingly, neither the mining companies nor regulators alerted community members to the hazards of the mine discharges, so Mr. King unknowingly played in the contaminated wash as a child.⁸³ Mr. King also describes the

⁷⁷ Rita Capitan Testimony at ¶¶ 58-60.

⁷⁸ *Id.* at ¶ 60.

⁷⁹ *Id.* at ¶¶ 39-40.

⁸⁰ *Id.* at ¶¶ 42-49, 68.

⁸¹ *Id.* at ¶ 57.

⁸² King Testimony at ¶ 45.

⁸³ *Id.* at ¶¶ 49-51, 64.

negligence that led to the worst nuclear accident in United States history: the 1979 UNC Churchrock tailings spill.⁸⁴ Mr. King notes that no government has required that the uranium industry clean up the contamination from mine water discharge or the 1979 spill.⁸⁵ Against this backdrop, Mr. King testifies that the constant threat of new uranium mining weighs heavily on his mind and has caused substantial emotional distress.⁸⁶ Indeed, Mr. King indicates that the NRC's decision has robbed him of what should have been the best years of his life.⁸⁷

Ms. Smith describes how Federal government policy regarding existing mine clean up and licensing new mines is just a part of larger racist structures that impact the Diné people.⁸⁸ Ms. Smith describes how the United States government treats Navajo people as if they have no worth.⁸⁹

Mr. Perry describes how the United States' treatment of the Diné with respect to uranium mining, but also in other contexts, has resulted in inter-generational trauma.⁹⁰

⁸⁴ *Id.* at ¶¶ 57-63.

⁸⁵ *Id.* at ¶¶ 47-48; *see also*, Benally Testimony at 40.

⁸⁶ King Testimony at ¶¶ 34-37.

⁸⁷ *Id.* at ¶ 41.

⁸⁸ Written Testimony of Christine Smith at ¶¶ 37-38 (Oct. 1, 2021) ("Smith Testimony"), appended as Attachment I.

⁸⁹ *Id.* at ¶ 37.

⁹⁰ Perry Testimony at ¶¶ 43, 47, 52, 53, 56.

The State's audacity in permitting new mines without having addressed waste from historic mining demonstrates the State's view of Native peoples as expendable.⁹¹ Further, Mr. Perry discusses how current uranium mining and milling waste offends Diné cultural beliefs and that allowing the opportunity for new waste creation only adds to that offense.⁹²

3. *The United States has Failed to Create and Maintain Conditions that Respect the Dignity of Petitioners and their Communities, in Violation of Petitioners' Right to Life.*

Under Article I of the American Declaration, the United States is required to not only avoid affirmatively taking life, but is also required to create and maintain conditions that promote physical safety and well-being, which includes the ability to live with dignity.⁹³ The Commission has determined that severe environmental contamination is inimical to the right to life.⁹⁴ The Commission's interpretation of the right to life includes actions which will lead to environmental contamination.⁹⁵

⁹¹ *Id.* at ¶¶ 61, 69; Smith Testimony at ¶¶ 37-38.

⁹² Perry Testimony at ¶¶ 61-64.

⁹³ *Third Report on the Situation of Human Rights in Paraguay*, Ch. V, ¶ 11.

⁹⁴ *Report on the Situation of Human Rights in Ecuador*, Ch. VIII, EOA/Ser.L/V/II96, doc. 10, rev. 1.

⁹⁵ Inter-American Commission on Human Rights, Report No. 2/12, *Indigenous Communities of the Lhaka Honhat (Our Land) Association v. Argentina* at ¶ 208 (Merits) (Jan. 26, 2012); ADRIP Art. XIX.3.

In this case, the United States has deprived Petitioners' of their right to life in two ways. First, based on facts established in the NRC hearing on HRI/NuFuels' license and the NRC's own admissions, outlined above and in the Petition, HRI/NuFuels' proposed ISL uranium mine will contaminate groundwater, both inside and outside the mine area and result in soil contamination. Moreover, the ISL industry's operational history prior to NRC's licensing decision, which was readily available, indicated that groundwater and soil pollution at the proposed mine is inevitable. Indeed, the Mobil 9 ISL pilot project, upon which the NRC based HRI/NuFuels' restoration requirements and surety bond, was an abject failure, in terms of groundwater restoration.⁹⁶ The NRC's foreknowledge that HRI/NuFuels will contaminate groundwater and surface water and soil in Crownpoint and Churchrock fails to create conditions conducive to living a dignified life.

Second, while the NRC's decision to license the HRI/NuFuels ISL project in itself denies petitioners the right to life under Article I of the American Declaration, the NRC's decision is particularly degrading in light of the United States' past uranium development policies and ongoing failure to remediate widespread uranium mining and milling contamination in Navajo communities. In sum, the United States' ongoing

⁹⁶ Mitchell Capitan Testimony at ¶¶ 24, 29-30; *see also*, LBP-99-30, 50 N.R.C. at 109 (finding that 26% of Mobil Section 9 restoration goals were not met, including the goals for uranium, radium, molybdenum and arsenic, all of which have human health effects).

cultural and physical oppression of the Diné, including Petitioners, denies them the right to live with dignity.

B. The United States has Deprived Petitioners of their Right to Health as Guaranteed by the American Declaration.

1. *Legal Standards Governing the Right to Health.*

Article XI of the American Declaration guarantees the right of “every person” to “the preservation of his health through sanitary and social measures relating to food, clothing, housing and medical care, to the extent permitted by public and community resources.” The Commission has interpreted an analogous provision in the American Convention to include the following:

... the essence of the State obligation to comply with legal protection to guarantee the social and economic aspirations of its people, giving priority to their needs for health, food and education. Prioritizing the “right to survive” and “basic needs” is a natural consequence of the right to personal security.⁹⁷

Further, the Commission has issued precautionary measures in order to protect the right to health encompassed in the American Convention. In *San Mateo de Huanchor Community v. Peru*, the Commission issued a precautionary measure based on the petitioners’ ongoing exposure to toxic mine waste sludge, finding “[t]he administrative decisions that were taken were not observed, more than three years have elapsed, and

⁹⁷ Inter-American Commission on Human Rights, Annual Report 1988, ¶ 322, OEA/Ser.L/V/II.74, Doc. 10, rev. 1 (Sept. 16, 1988).

the toxic waste sludge of the Mayoc field continues to cause damage to the health of the population of San Mateo de Huanchor, whose effects are becoming more acute over time.”⁹⁸

Finally, the Inter-American Court has likewise recognized the link between a clean environment and the right to health. In *Case of the Yakye Axa Indigenous Community v. Paraguay*, the Inter-American Court noted:

Special detriment to the right to health, and closely tied to this, detriment to the right to food and access to clean water, have a major impact on the right to a decent existence and basic conditions to exercise other human rights, such as the right to education or the right to cultural identity. In the case of indigenous peoples, access to their ancestral lands and to the use and enjoyment of natural resources found on them is closely linked to obtaining food and clean water.⁹⁹

Similar language in other international instruments has been interpreted to include the positive right of a clean and healthy environment. The Committee on Economic, Social and Cultural Rights’ (“CESCR”) General Comment 14 provides the most comprehensive interpretation of this right. General Comment 14 specifically interprets Article 12 of the International Covenant on Economic, Social and Cultural Rights, which guarantees the right of “everyone to enjoyment of the highest attainable

⁹⁸ *San Mateo de Huanchor Community v. Peru* at ¶ 59, Report No. 69/04, OEA/Ser.L/V/II.122, Doc. 5, rev. 1 (2004).

⁹⁹ *Case of the Yakye Axa Indigenous Community v. Paraguay* at ¶ 167, Complaint No. 12.313, Judgment (Merits, Reparations and Costs) (June 17, 2005). See, also, *Indigenous Communities of the Lhaka Honhat (Our Land) Association v. Argentina* at ¶ 208.

standard of physical and mental health.” In interpreting this Article, the CESCR concluded:

[T]he drafting history and the express wording of article 12.2 acknowledge that the right to health embraces a wide range of socio-economic factors that promote conditions in which people can lead a healthy life, and **extends to the underlying determinants of health, such as food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment.**¹⁰⁰

In the context of Indigenous peoples, the CESCR further determined that:

[T]he Committee considers that development-related activities that lead to the displacement of indigenous peoples against their will from their traditional territories and environment, denying them their sources of nutrition and breaking their symbiotic relationship with their lands, has a deleterious effect on their health.¹⁰¹

Similarly, the United Nations Declaration on the Rights of Indigenous Peoples (“UNDRIP”) provides:

Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.

.....

States shall take effective measures to ensure that no storage or

¹⁰⁰ CESCR, *Substantive Issues Arising in the Implementation of the International Covenant on Economic, Social and Cultural Rights*, General Comment No. 14, *The right to the highest attainable standard of health* (article 12 of the International Covenant on Economic, Social and Cultural Rights) at ¶¶4, 11, E/C.12/2000/4 (Aug. 11, 2000) (“General Comment No. 14”) (emphasis added).

¹⁰¹ *Id.* ¶ 27.

disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.¹⁰²

The American Declaration on the Rights of Indigenous Peoples has a similar provision guaranteeing a clean environment, which provides:

Indigenous peoples have the right to be protected against the introduction, abandonment, dispersion, transit, indiscriminate use, or deposit of any harmful substance that could adversely affect indigenous communities, lands, territories and resources.¹⁰³

2. *Facts Supporting Petitioners' Allegations.*

As Petitioners demonstrate in Section III.B.2.a, above, by licensing HRI/NuFuels' ISL uranium mine, the United States is effectively countenancing widespread groundwater contamination in two Indigenous communities. Further, as Petitioners demonstrate in Section III.B.2.b, above, the State's licensing action in the HRI/NuFuels case adds to existing risk from exposure to historic uranium mining and milling waste that has not been remediated or has been inadequately remediated. The same facts that establish that the United States has failed to protect Petitioners' right to life under the American Declaration likewise establish that the United States has failed to protect Petitioners' and their communities' right to health under Article XI of the American Declaration.

¹⁰² United Nations General Assembly, *United Nations Declaration on the Rights of Indigenous Peoples*, (A/Res/61/295), Article 29(1),(2) (Sept. 13, 2007).

¹⁰³ ADRIP Article XIX.3.

In addition to the facts established in Sections III.B.2.a and b, the following facts support Petitioners' contentions that the United States has failed to ensure their right to health. As Mr. Shuey explains in his Declaration, epidemiological research since 2011 further demonstrates that exposure to uranium mine and mill waste can increase the likelihood of numerous diseases.

First, Mr. Shuey notes that many people living in the Eastern Navajo Agency communities, which include Crownpoint and Churchrock, are exposed to uranium mine and mill wastes from historical mining and milling in several different ways. Those exposure pathways include through surface water and soil due to rapid oxidation of uranium, which increases its mobility through the environment.¹⁰⁴ Exposures have also occurred through ingestion of groundwater.¹⁰⁵ Exposure to uranium and other mining related heavy metals can also occur through ingestion from subsistence activities. For example, in her 1999 testimony before the NRC, Dr. Benally noted that cattle and sheep grazed in Churchrock and the Ambrosia Lake uranium district to the east of Crownpoint had elevated levels of radionuclides in their bones, organs and muscle compared with control livestock.¹⁰⁶

¹⁰⁴ Shuey Declaration at ¶¶ 19-21.

¹⁰⁵ *Id.* at ¶ 28.

¹⁰⁶ Benally Testimony at 40-41 and studies cited therein.

Indeed, a recent study of 1000 adults and 800 infants living in uranium-impacted communities showed that 25% - 50% of adults had more uranium in their urine than 95% of the U.S. adult population and 30% of infants at their first year had more uranium in their urine than 95% of U.S. adults.¹⁰⁷

Exposure to uranium and mixed metals waste from uranium mines and mills are associated with a higher likelihood of certain diseases in exposed populations.¹⁰⁸ Recent research has linked chronic exposure to mine and mill waste with an increased likelihood of: metabolic diseases, including kidney disease and diabetes;¹⁰⁹ cardiovascular disease;¹¹⁰ autoimmune disease;¹¹¹ and premature birth.¹¹²

Finally, as Petitioners alleged in their Petition, HRI/NuFuels may forcibly remove Mr. King and his family from his land at Churchrock Section 17 for the duration of its mining operation at that site.¹¹³

¹⁰⁷ Shuey Declaration at ¶ 29.

¹⁰⁸ *Id.* at ¶¶ 23-30.

¹⁰⁹ *Id.* at ¶ 25.

¹¹⁰ *Id.* at ¶ 26.

¹¹¹ *Id.* at ¶ 27.

¹¹² *Id.* at ¶ 29.

¹¹³ Petition at 12, fn. 36.

3. *The United States has Failed to Provide a Healthy Environment for Petitioners.*

The United States has failed to ensure Petitioners' and their communities' right to health guaranteed by Article XI of the American Declaration and international norms. The State's failure is many fold.

First, the NRC licensed a uranium ISL operation that it reasonably believes will contaminate groundwater and soil in Crownpoint and Churchrock. This action by itself will result in community members in Crownpoint and Churchrock being exposed to radionuclides and heavy metals through several pathways, including ingestion and inhalation, should uranium mining operations begin. This breaches the United States' obligation to promote conditions that lead to a clean and healthy environment. It further violates the State's obligation to prevent development that will lead to environmental contamination.

The State's failure to create conditions that promote a healthy environment is even more egregious given that the State has failed to address environmental contamination and the concomitant health effects caused by waste from historic uranium mining and milling. In *San Mateo de Huanchor Community v. Peru* the Commission issued precautionary measures based on Peru's failure to mitigate toxic mine waste sludge in an Indigenous community after approximately five years of

exposure.¹¹⁴ In this case, the United States has failed to mitigate exposure to radionuclides and toxic heavy metals from historic uranium mining and milling in and near the Churchrock and Crownpoint communities for seven decades. There is no possible construction of international treaties and norms that would allow the United States to disclaim its duty to protect Petitioners' and their communities' right to health in this case.

Finally, HRI/NuFuels' license and NRC regulations require that the public be excluded from mine areas.¹¹⁵ Thus, if HRI/NuFuels begin mining operations on the Churchrock Section 17 site, Larry King and his family will be involuntarily dispossessed of their land.

C. The United States has Deprived Petitioners of their Right to Property as Guaranteed by the American Declaration.

1. *Legal Standards Governing the Right to Property.*

Article XXIII of the American Declaration provides, "[e]very person has a right to own such private property as meets the essential needs of decent living and help to maintain the dignity of the individual and of the home."

The Commission has interpreted Article XXIII of the American Declaration in light of Article XXI of the American Convention, which provides, "[e]veryone has the

¹¹⁴ *San Mateo de Huachor Community v. Peru* at ¶ 18.

¹¹⁵ *See, e.g.*, 10 C.F.R § 20.1003; SUA-1580, License Condition 9.6.

right to the use and enjoyment of his property. The law may subordinate such use and enjoyment to the interest of society.” While Article XXI of the American Convention is qualified, the Inter-American Court has interpreted this Article very specifically in the context of Indigenous peoples’ land and resources. In the *Yakye Axa* case, the Court stated:

c) protection of the right of indigenous peoples to their ancestral territory is an especially important matter, as its enjoyment involves not only protection of an economic unity but also protection of the human rights of a collectivity whose economic, social and cultural development is based on its relationship with the land;

.....

g) the territory they claim is a sacred place, the only place where they will be completely free because it is the land that belongs to them, the place where they can recover their shared existence, culture and joy.¹¹⁶

The Commission itself determined:

As for the socio-cultural dimension of this relationship, it has been pointed out that the close relationship between indigenous and tribal peoples and their traditional territories and natural resources is a constitutive element of their culture, understood as a particular way of life; the free exercise of the right to territorial property is essential for the enjoyment and perpetuation of their culture.

.....

Therefore, since territory and natural resources are constitutive elements of the worldview, spiritual life and mode of subsistence of indigenous and tribal peoples, they form an intrinsic part of their members’ right to cultural identity. Recognition of ancestral lands and territories is fundamental for the perpetuation of indigenous and tribal peoples’ cultural structure. Indigenous and tribal peoples are entitled to have the State effectively guarantee their right to their cultural identity. If the State fails to secure the right to territorial property of indigenous communities

¹¹⁶ *Yakye Axa Indigenous Community v. Paraguay* at ¶ 120 (c) and (g).

and their members, they are deprived “not only of material possession of their territory but also of the basic foundation for the development of their culture, their spiritual life, their wholeness and their economic survival.”¹¹⁷

The Commission’s view is consistent with the American Declaration on the Rights of Indigenous Peoples, which provides that Indigenous peoples have the right to be protected against the introduction, dispersion, abandonment or deposit of any harmful substance that could adversely affect Indigenous communities, lands or resources.¹¹⁸

The Commission has also determined, however, that the strong protections afforded Indigenous lands and resources do not represent a *per se* prohibition on development.¹¹⁹ Instead, the state must fulfill a three-part test when considering approvals of permits, licenses or concessions that would affect Indigenous lands.¹²⁰ The state must assure that: 1) it complies with the expropriation requirements of Article XXI of the American Convention on Human Rights; 2) the Indigenous group’s physical and cultural survival is ensured; and 3) it has fulfilled the procedural guarantees of

¹¹⁷ *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶ 174.

¹¹⁸ ADRIP, Article XIX.3.

¹¹⁹ *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶ 211.

¹²⁰ *Id.*

participation,¹²¹ environmental impact assessment, and benefit sharing.¹²² Compliance with these requirements is mandatory when projects will have an impact on any natural resources that are critical for the physical and cultural survival of Indigenous peoples.¹²³

With respect to the first requirement, the Commission has noted that a state may restrict the use and enjoyment of property consistent with Article XXI of the American Convention where the restrictions are: 1) previously established by law; b) necessary; c) proportional; and d) with the aim of achieving a legitimate objective in a democratic society.¹²⁴

With respect to the second requirement, the Commission has interpreted “survival” as something beyond mere physical subsistence. Instead, “survival” of a tribal people is understood as the state’s responsibility to ensure the continuance of the relationship of the Indigenous people with their land and their culture.¹²⁵

With respect to the third requirement, the state is required to guarantee that before restricting the use or enjoyment of Indigenous property, the state must ensure

¹²¹ The ADRIP explicitly requires States to secure the free, prior and informed consent of Indigenous peoples prior to the approval of any project affecting their lands or territories, particularly in connection with the development and exploitation of mineral, water or other resources. Article XXIX.4.

¹²² *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶ 211.

¹²³ *Id.* at ¶ 212.

¹²⁴ *Id.* at ¶ 213.

¹²⁵ *Id.* at ¶ 214.

that the Indigenous peoples have given their free, prior and informed consent to the restriction.¹²⁶ Consultation with Indigenous peoples must occur before the design and execution of natural resource projects on Indigenous lands; it must be culturally adequate and take into account the respective people's traditional decision-making methods; and it must be informed, which requires the full provision of precise information on the nature and consequence of the consulted project to the communities.¹²⁷ These three factors should be considered in light of the Navajos' particular historical, cultural, social and economic situation.¹²⁸

2. *Facts Supporting Petitioners' Allegations.*

In this case, the United States has failed to meet the requirements for guaranteeing Petitioners' right to property. As demonstrated in Sections III.A and B, above, if the state licensed ISL uranium operation begins, it will contaminate groundwater, air and soil in Crownpoint and Churchrock increasing the risk of morbidity and mortality to Petitioners and other community members. By licensing an operation it knew and continues to know will result in such contamination, the NRC has violated Petitioners' right to property in three ways.

¹²⁶ *Id.* at ¶¶ 215-218.

¹²⁷ *Id.* at ¶ 218.

¹²⁸ *Mary and Carrie Dann v. United States* at ¶ 125.

- a. Destroying water, air and land will destroy fundamental aspects of Petitioners' cultural identity.

Petitioner Jonathan Perry is considered a leader (Nataanii) in his community.

When he served in the Navajo Nation Council, the legislative branch of Navajo Nation government, Mr. Perry was appointed to the Sacred Sites Subcommittee, which specifically required its members to be familiar with Diné cultural practices.¹²⁹

Community members and leaders also regularly consult with Mr. Perry about Diné language and cultural practices.¹³⁰ As Mr. Perry explains in his Testimony, the land, air, and water are fundamental to Diné identity.¹³¹ From the time a Navajo child is born, their connection to a particular place and the Earth itself is marked by burying their umbilical cord where they live.¹³² This particular place forms the basis for all a Diné person's relationships.¹³³ A person's clan is associated with particular geography.¹³⁴ Further, identity is informed by the particular plants and animals native to the place where the Diné person was born.¹³⁵ Particular geography is also important to Diné

¹²⁹ Perry Testimony at ¶ 14.

¹³⁰ *Id.* at ¶¶ 17-18.

¹³¹ *Id.* at ¶¶ 26-58.

¹³² *Id.* at ¶ 31.

¹³³ *Id.* at ¶¶ 31, 34, 38, 39.

¹³⁴ *Id.* at ¶¶ 38-39.

¹³⁵ *Id.*

songs and ceremonies.¹³⁶ When prayers are made, local features are named: the peaks of the mountains that receive the first sunlight of the day and the crests of hills where the last sunlight hits as the sun sets.¹³⁷ Diné healers (Hataáíí) collect plants and stones from specific locations to put in their medicine bundles.¹³⁸ Medicine bundles are passed down from generation to generation of healers and must periodically be renewed by going back to the specific locations to collect plants and stones and conduct ceremonies.¹³⁹ This connection to place is foundational to Diné identity.¹⁴⁰ If places or resources are destroyed, it destroys what it means to be Navajo.¹⁴¹

These places are not limited to the current boundaries of the Navajo Nation, but instead encompass all of the Navajo traditional territory located between the Four Sacred Mountains.¹⁴² The approximate scope of the Diné traditional territory is illustrated in Figure 3.

¹³⁶ *Id.* at ¶¶ 45-46.

¹³⁷ King Testimony at ¶ 68.

¹³⁸ Perry Testimony at ¶¶ 41-44.

¹³⁹ *Id.*

¹⁴⁰ *Id.* at ¶¶ 55-61.

¹⁴¹ *Id.* at ¶ 74.

¹⁴² *Id.* at ¶ 44.

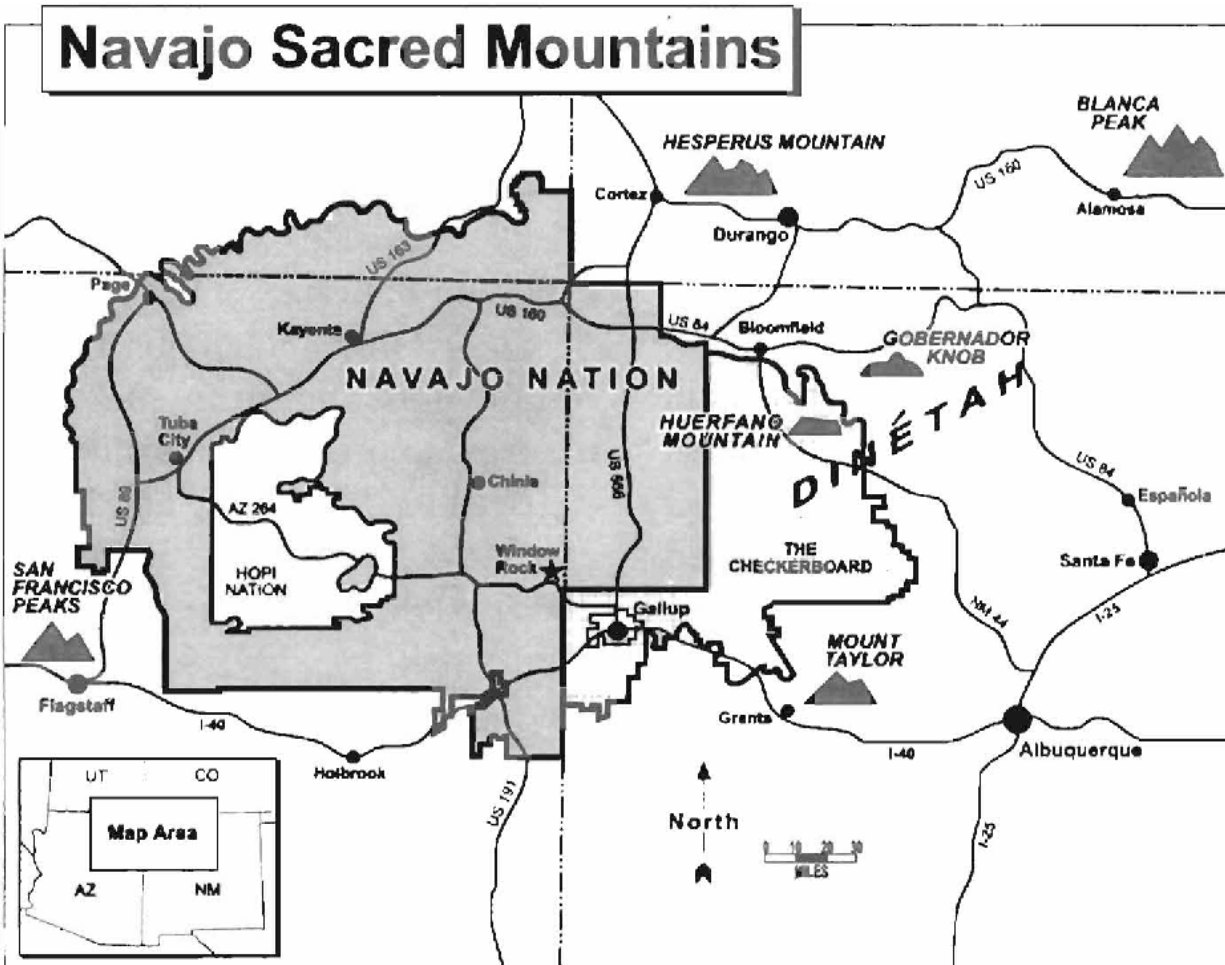


Figure 3.

The web of relationships (k'é) – between blood relations, clan, plants and animals, the land between the four Sacred Mountains and all the elements must be maintained in a good way.¹⁴³ When k'é is properly maintained, balance (hózhó) is achieved.¹⁴⁴ Crucial to maintaining hózhó are the four sacred elements: air, water, land

¹⁴³ *Id.* at ¶¶ 26-27.

¹⁴⁴ *Id.* at ¶ 28.

and corn pollen.¹⁴⁵ These four elements are central to Diné cultural identity.¹⁴⁶

Destroying any of the four elements amounts to destroying part of the individual, part of the family structure, part of the community and part of Navajo identity.¹⁴⁷ It creates disharmony and brings harm to the Diné.¹⁴⁸ Keeping relationships in balance is guided by natural law, traditional law, customary law and common law.¹⁴⁹ These laws include instructions about which natural substances the Diné can use and which must be avoided.¹⁵⁰ When the rules set out by Diné law are violated, imbalance occurs and harm comes to the people.¹⁵¹

There are Diné cultural beliefs specific to uranium. Uranium represents the counterbalance to the sacred element of corn pollen.¹⁵² Corn pollen represents a basis for life.¹⁵³ In contrast, uranium represents a threat to life and is only invoked during

¹⁴⁵ *Id.* at ¶ 32; *see also*, 1 N.N.C. § 205(A) (Diné Natural Law mandating protection of the four sacred elements of life: air, light/fire, water and earth/pollen).

¹⁴⁶ Perry Testimony at ¶ 32; Smith Testimony at ¶ 39.

¹⁴⁷ Smith Testimony at ¶¶ 39, 40.

¹⁴⁸ Perry Testimony at ¶ 34.

¹⁴⁹ *Id.* at ¶ 29.

¹⁵⁰ *Id.* at ¶ 34.

¹⁵¹ *Id.* at ¶¶ 34-35.

¹⁵² *Id.* at ¶ 68.

¹⁵³ *Id.*

war ceremonies or ceremonies meant to do harm.¹⁵⁴ Therefore, Diné culture generally instructs that uranium is not to be disturbed.¹⁵⁵

- b. The NRC approved the proposed ISL uranium mine without the communities' free, prior and informed consent.

Notwithstanding the substantive reasons why the United States failed to guarantee Petitioners' rights under Article XXIII of the American Declaration, the United States, through the NRC, failed to obtain the Petitioners' and their communities' free, prior and informed consent for the proposed project. Article XXIII should be interpreted in the context of developing international law.¹⁵⁶ Thus, while Article XXIII of the American Declaration does not contain language regarding free, prior and informed consent when exploiting resources on and under Indigenous lands, interpreting that article in light of evolving international norms such as the ADRIP and the *Lhaka Honhat* decision clearly require that the State should have secured the Navajo Nation's, individual Chapters' and Petitioners' free, prior and informed consent.¹⁵⁷

In this case, the NRC failed to inform any of the Petitioners, much less obtain their consent, prior to beginning the licensing process for the Crownpoint Uranium

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Maya Indigenous Communities of the Toledo District Belize* at ¶ 86.

¹⁵⁷ ADRIP Article XXIX.4; *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶ 218.

Project.¹⁵⁸ Indeed, Petitioners Rita and Mitchell Capitan read about the licensing process in the newspaper.¹⁵⁹ Mr. King recalled that HRI, but not the NRC, notified him and his father about the proposed mine during, but not prior to, the NRC process, but his father did not consent to HRI operating the mine on his land.¹⁶⁰ Mr. King affirmatively rejected locating the mine on land where his family lives.¹⁶¹ Mr. King is also very clear that he has not consented to being dispossessed of his land and his home in order to accommodate ISL mining, nor will he ever consent to dispossession and relocation.¹⁶² Additionally, each of the Petitioners' ongoing challenge to the Crownpoint Uranium Project is evidence in itself that they do not consent to ISL mining in their communities.

Moreover, the United States presents no evidence or even indication that the Navajo Nation government provided free, prior and informed consent to the NRC for the Crownpoint Uranium Project. Indeed, the NRC's Final Environmental Impact Statement for the Crownpoint Uranium Project ("FEIS") indicates that at the time the NRC was considering HRI/NuFuels' license application, the Navajo Nation had a

¹⁵⁸ Perry Testimony at ¶¶ 85-89; King Testimony at ¶ 11; Rita Capitan Testimony at ¶¶ 14-15; Smith Testimony at ¶ 36.

¹⁵⁹ Rita Capitan Testimony at ¶¶ 14-15.

¹⁶⁰ King Testimony at ¶ 16.

¹⁶¹ *Id.*

¹⁶² *Id.*

moratorium on uranium mining in place.¹⁶³ Further, the Navajo Nation entity responsible for providing municipal water service throughout the Navajo Nation opposed ISL mining in Crownpoint.¹⁶⁴

Even assuming for the sake of argument that the Navajo Nation provided free, prior and informed consent to the Crownpoint Uranium Project, which it did not, the Navajo Nation effectively withdrew consent when it passed the Diné Natural Resources Protection Act in 2005, which bans all uranium mining and processing within Navajo Indian Country.¹⁶⁵

3. *The United States has Deprived Petitioners of their Property under Article XXIII of the American Declaration.*

As Petitioners have established in the Petition and Sections III.A and C of their Additional Observations on the Merits, the NRC's licensing decision is part of an ongoing State policy regarding uranium mining and milling on Indigenous lands that

¹⁶³ FEIS at 4-119. In the same section, the FEIS notes the Crownpoint and Churchrock Chapters had passed resolutions supporting the HRI/NuFuels project. Those resolutions were subsequently superseded in both Chapters by resolutions opposing the ISL mine. The resolutions opposing the mine remain in effect today. Moreover, Crownpoint Chapter, Churchrock Chapter, Becenti Chapter, Iyanbito Chapter and the Eastern Navajo Agency Council, which encompasses representatives from every Chapter in the Eastern Agency, have all passed resolutions supporting Petitioners' Petition and requests for relief. Those resolutions are appended as Attachments J through N. A map of the Chapters in the Eastern Agency is appended as Attachment O. The NRC's Final EIS is appended to the United States' Response to Petition 654-11 (March 3, 2019).

¹⁶⁴ NTUA 11-97, *Resolution of the Management Board of the Navajo Tribal Utility Authority Stating the Position of Navajo Tribal Utility Authority on Proposed Uranium Solution Mining in Eastern Navajo Agency by Hydro Resources, Inc.*

¹⁶⁵ 18 N.N.C. §§ 1301-1303.

has had and will have an adverse impact on resources that are critical for the physical and cultural survival of Diné communities. Thus, the United States must fulfill all the requirements outlined in the *Lhaka Honhat* report.¹⁶⁶ The United States has failed to do so.

The United States has failed to meet the first part of the *Lhaka Honhat* test because at no time did the Nuclear Regulatory Commission establish that the Crownpoint Uranium Project was necessary. Indeed, in the Purpose and Need statement of the Final Environmental Impact Statement for the mine, which the State attached to its response to the Petition, the NRC stated, “[t]he purpose of the proposed action is to license and regulate HRI’s proposal to construct and operate facilities for ISL uranium mining and processing.”¹⁶⁷ The NRC also stated, “[t]he NRC’s need for action is to fulfill its statutory responsibility to protect public health and safety and the environment in matters related to source nuclear material (Atomic Energy Act of 1954 as amended).”¹⁶⁸ Rather than identifying any legitimate need for the ISL mine, for example, to satisfy demand for nuclear fuel or to ensure national security, the NRC identified the sole need as the need to issue a license and regulate the mine.¹⁶⁹ If the

¹⁶⁶ *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶¶ 211-218.

¹⁶⁷ NUREG 1508 at 1-3.

¹⁶⁸ *Id.*

¹⁶⁹ The NRC’s statement of purpose and need also likely violates domestic law. Under the National Environmental Policy Act, an agency may not define its objectives so narrowly as to restrict consideration

only need the United States could identify was to license the Crownpoint Uranium Project for its own sake, the mine is clearly not necessary. The NRC's circular reasoning for the project's need is particularly concerning in light of the devastation from historic uranium mines and mills that continues to affect Diné communities as a result of prior decisions from the NRC and other federal agencies.

The United States has also failed to satisfy the second requirement of the *Lhaka Honhat* test because the United States cannot ensure Petitioners' or their communities' physical and cultural survival. As Petitioners amply demonstrate in Section III.C.2, above, in their attached testimony, and in their Petition, destruction of water and soil resources will likewise destroy their culture.

While the United States may focus on the fact that HRI/NuFuels has not yet begun mining, this is beside the point.¹⁷⁰ HRI/NuFuels has expressed the intent to mine uranium in Crownpoint and Churchrock, and the NRC has given it permission to do so. Once mining begins, the damage will be done – groundwater will be irreparably contaminated. Ensuring continuance of Petitioners' relationship with their land and

of a broad range of alternatives. *Coalition for the Advancement of Reg'l Transp. v. FHA*, 959 F.Supp. 2d 982, 1001 (W. Dist. Ky., 2013).

¹⁷⁰ Case No. 14.544, Response of United States at 41.

resources, in this case, is a prospective obligation, which the United States has not fulfilled.¹⁷¹

Finally, the United States cannot establish that either Petitioners or the Navajo Nation has given free, prior and informed consent to the Crownpoint Uranium Project. As Petitioners have demonstrated, the United States failed to even notify them of the ISL project, much less seek and obtain their consent. Further, Petitioner Larry King indicates that when approached by HRI/NuFuels, he explicitly rejected the mine. Likewise, the Navajo Nation has explicitly rejected ISL mining within its sovereign territory. The United States has failed entirely to ensure Petitioners' use and enjoyment of their land and resources under Article XXIII.

D. The United States has Deprived Petitioners of a Fair Trial as Guaranteed by the American Declaration.

1. *Legal Standards Governing the Right to a Fair Trial.*

Although Petitioners did not contend the United States violated their rights to a fair hearing, in its Admissibility Report in this case, the Commission admitted that issue *sua sponte*. The Commission has the power and duty to evaluate all legal issues that a situation may present, irrespective whether the parties raised those issues.¹⁷²

¹⁷¹ See, United Nations Declaration on the Rights of Indigenous Peoples, Article 8.2.(a),(b) directing states to provide mechanisms to prevent destruction of culture and dispossession of lands and resources.

¹⁷² Inter-American Commission on Human Rights, Report No. 6/99, *Oveláreo Tames v. Brazil* at ¶ 40 (merits) (April 13, 1999).

In this case, the United States has violated Petitioners right to a fair trial under Article XVIII of the American Declaration. Article XVIII provides:

Every person may resort to the courts to ensure respect for his legal rights. There should likewise be available to him a simple, brief procedure whereby the courts will protect him from acts of authority that, to his prejudice, violate any fundamental constitutional rights.

In the case of *Ovelário Tames v. Brazil*, the Commission determined Brazil had violated the petitioners' right to a fair trial when the investigation and proceedings regarding Mr. Tames' death in state custody lasted more than eight years.

2. *Facts Supporting the State's Violation of Petitioners' Right to a Fair Trial.*

In this case, Petitioners ENDAUM, Rita Capitan, Mitchell Capitan, and Larry King spent ten years involved in administrative litigation before the Nuclear Regulatory Commission.¹⁷³ Those Petitioners spent an additional five years appealing the NRC's final decision.¹⁷⁴

The NRC's licensing process is technical, complex and expensive. For example, the NRC's Final Environmental Impact Statement for the Crownpoint Uranium Project is 448 pages long and filled with technical jargon. Further, in order to prosecute their case before the NRC, Petitioners had to enlist the expertise of hydrologists, geochemists, geologists,

¹⁷³ Petition at 4.

¹⁷⁴ *Id.*

health physicists, medical doctors and lawyers, among others. Consequently, Petitioners were forced to raise and spend over a million dollars on technical experts, which resulted in thousands of pages of written technical testimony and legal briefings. As Petitioner Rita Capitan notes in her attached written testimony, she believes it is unlikely any other Navajo community could oppose a uranium ISL mine under the current legal and regulatory framework.¹⁷⁵

3. *The United States has Failed to Provide Petitioners a Fair Trial Under Article XVIII.*

The process the United States provided Petitioners was neither short nor simple, in violation of the standards in the American Declaration. In *Ovelário Tames v. Brazil*, the Commission found that a proceeding lasting over eight years violated the American Declaration's guarantee of a brief procedure. In this case, the domestic proceedings to challenge the NRC's decision lasted 15 years. Proceedings of this length must certainly also violate this guarantee.

Moreover, the NRC's proceedings also violated the American Declaration's guarantee of a simple procedure. The NRC's process of challenging a source and byproduct materials license is anything but simple. As the Natural Resources Defense Council points out, just challenging one aspect – compliance under the National

¹⁷⁵ Rita Capitan Testimony at ¶ 69.

Environmental Policy Act – of an ISL mine license is byzantine and resource intensive.¹⁷⁶

The logistical obstacles that the NRC's NEPA process presents notwithstanding, the NEPA process itself marginalizes Indigenous voices and traditional knowledge in favor of Western scientific materialism.¹⁷⁷

As Petitioners testify, their challenge to the NRC's decision has been complex, costly and emotionally draining.¹⁷⁸ Indeed, were it not for the serendipitous involvement of a community member who is an attorney, Petitioners may not have been able to challenge the NRC's decision at all.¹⁷⁹ The processes afforded Petitioners to challenge the NRC's licensing decision failed to secure the Petitioners' right to a fair trial under the American Declaration.

¹⁷⁶ Fettus, Geoffrey and McKinzie, Matthew, *Nuclear Fuel's Dirty Beginnings: Environmental Damage and Public Health Risks From Uranium Mining in the American West* at 24, Natural Resources Defense Council (March 2012), available at: <https://www.nrdc.org/sites/default/files/uranium-mining-report.pdf>.

¹⁷⁷ Dongoske, Kurt et. al., *The National Environmental Policy Act (NEPA) and the Silencing of Native American Worldviews*, 17 Environmental Practice 36, 43 (March 2015); available at: https://www.researchgate.net/publication/276379243_The_National_Environmental_Policy_Act_NEPA_and_the_silencing_of_Native_American_worldviews.

¹⁷⁸ Rita Capitan Testimony at ¶¶ 58-60, 74-75; King Testimony at ¶¶ 35-39.

¹⁷⁹ Rita Capitan Testimony at ¶¶ 24-27; King Testimony at ¶ 7.

E. The United States has Deprived Petitioners of the Right to Benefits of Culture as Guaranteed by the American Declaration.

1. *Legal Standards Governing the Right to Benefits of Culture.*

Article XIII of the American Declaration provides, in relevant part, “[e]very person has the right to take part in the cultural life of the community.” The Inter-American Commission has recognized the intimate ties between Indigenous cultural practices and land in the context of interpreting Indigenous peoples’ right to property.

The Commission found:

More particularly, the organs of the Inter-American System of Human Rights have acknowledged that indigenous peoples enjoy a particular relationship with the lands and resources traditionally occupied and used by them, by which those lands and resources are considered to be owned and enjoyed by the community as a whole and according to which **the use and enjoyment of the land and its resources are integral components of the physical and cultural survival of the indigenous communities and the effective realization of their human rights more broadly.**¹⁸⁰

Indeed, the Commission determined:

As for the socio-cultural dimension of this relationship, it has been pointed out that the close relationship between indigenous and tribal peoples and their traditional territories and natural resources is a constitutive element of their culture, understood as a particular way of life; the free exercise of the right to territorial property is essential for the enjoyment and perpetuation of their culture.

.....

Therefore, since territory and natural resources are constitutive elements of the worldview, spiritual life and mode of subsistence of indigenous and tribal peoples, they form an intrinsic part of their members’ right to cultural identity. Recognition of ancestral lands and territories is

¹⁸⁰ *Mayan Indigenous Communities of the Toledo District v. Belize* at ¶ 114 (emphasis added).

fundamental for the perpetuation of indigenous and tribal peoples' cultural structure. Indigenous and tribal peoples are entitled to have the State effectively guarantee their right to their cultural identity. If the State fails to secure the right to territorial property of indigenous communities and their members, they are deprived "not only of material possession of their territory but also of the basic foundation for the development of their culture, their spiritual life, their wholeness and their economic survival."¹⁸¹

Further, the Inter-American Court on Human Rights has stated:

The Court has determined that the culture of the members of the indigenous communities corresponds to a particular form of life, of being, seeing, and acting in the world, constituted from their close link with their traditional lands and natural resources, not only because they provide their means of subsistence, but also because they constitute an elemental part of their cosmovision, religiosity and, therefore, of their cultural identity.¹⁸²

Finally, both the American Declaration on the Rights of Indigenous Peoples and the United Nations Declaration on the Rights of Indigenous Peoples ("UNDRIP") recognize the fundamental relationship between Indigenous peoples and their land and resources as critical to realization of the right to cultural expression. The ADRIP provides that Indigenous peoples have the right to the protection of their cultural heritage, both collectively and individually.¹⁸³ Further, Indigenous peoples have the

¹⁸¹ *Indigenous Communities of the Lhaka Honhat (Our Land) Association* at ¶ 174.

¹⁸² Inter-American Court of Human Rights, *Case of Chitay Nech, et. al. v. Guatemala* (Preliminary Objections, Merits, Reparations and Costs) at fn. 160 (May 25, 2010).

¹⁸³ ADRIP, Article XIII.2.

right to recognition and respect for their spirituality, customs, traditions, beliefs and values.¹⁸⁴

Similarly, the UNDRIP provides that Indigenous peoples have the right to be free from the destruction of their culture.¹⁸⁵ Consequently, States have the obligation to provide effective mechanisms that prevent destruction of Indigenous peoples' culture and dispossession of their land and resources.¹⁸⁶

2. *Facts Supporting Petitioners' Allegations.*

Petitioners reiterate and incorporate by reference here, their allegations presented in their Petition at pages 17 -20 and 39 -40 with regard to the impacts that HRI/NuFuels' ISL mining will have on their culture. In addition, as explained in detail in Section III.C.2, and incorporated by reference here, Diné cultural identity is inseparable from the land between the Four Sacred Mountains and the Four Sacred Elements. Contamination or destruction of the land or any of the Four Sacred Elements such as water, diminishes the Diné culturally, both individually and collectively.¹⁸⁷

¹⁸⁴ *Id.* at Article XIII.3.

¹⁸⁵ United Nations Declaration of the Rights of Indigenous Peoples, Article 8.1.

¹⁸⁶ *Id.* at Article 8.2.(a), (b).

¹⁸⁷ Perry Testimony at ¶ 74; Smith Testimony at ¶ 39; *see also*, 1 N.N.C. § 205 (enacting Diné Natural Law as the foundation for decisions regarding natural resources).

Moreover, the Diné have specific cultural beliefs about uranium and how it should not be disturbed.¹⁸⁸ Disturbing uranium through ISL mining (or any other kind of mining) not only leads to contamination of water and land, but in itself violates Diné cultural proscriptions, causing disharmony.¹⁸⁹

The NRC considered the ISL mine's impacts on Diné culture in only the narrowest sense. The FEIS evaluates the mine's impacts on archaeological sites and "traditional cultural properties" designated or eligible for designation under the National Historic Preservation Act.¹⁹⁰ To the extent the FEIS mentions the living aspects of culture, it does so in only the most general and cursory terms, stating:

Some Native Americans hold spiritual or religious beliefs that any mining activity upsets the balance among nature, people, and their creator. It is difficult to determine the significance of such an impact, either in terms of cultural resources or environmental justice.¹⁹¹

Additionally, as Petitioners point out in their attached testimony, the NRC did not inquire about the effects the proposed ISL mine would have on their cultural beliefs, practices and expression.¹⁹²

¹⁸⁸ Perry Testimony at ¶ 68.

¹⁸⁹ *Id.* at ¶¶ 27-35, 74.

¹⁹⁰ FEIS at 4-109 – 4-112.

¹⁹¹ FEIS at 4-119.

¹⁹² Perry Testimony at ¶¶ 85-89; King Testimony at ¶ 11; Rita Capitan Testimony at ¶¶ 14-15; Smith Testimony at ¶ 36.

3. *The United States has Violated Petitioners' Right to the Benefits of Culture under Article XIII.*

The United States has failed entirely to protect Petitioners' right to the benefit of their culture under the American Declaration's standards. In order to guarantee the integrity of the land and resources, which are the foundations of Diné cultural beliefs, practices and expression, the NRC would have had to first acknowledge and investigate those beliefs, practices and expressions. The NRC failed to do so. Without taking this fundamental step, any remaining analyses the NRC conducted with respect to the proposed mine's effects on land, air and water are at best incomplete. The United States cannot contend that it has endeavored to protect Petitioners' right to the benefit of their culture without even knowing what Diné cultural beliefs, practices and expressions are.

The United States' failure to acknowledge and investigate Diné cultural beliefs, practices and expressions notwithstanding, the NRC's decision to license HRI/NuFuels' ISL mine robs Petitioners and their communities of the benefits of culture. The NRC recognizes that restoration of groundwater after ISL mining is highly uncertain and most likely impossible.¹⁹³ The NRC also acknowledges that soil contamination from spills and pipeline leaks or ruptures could also occur.¹⁹⁴ Thus, under Article XIII, the United States should have taken steps to prevent contamination of these resources and the attendant

¹⁹³ FEIS at 4-113.

¹⁹⁴ FEIS at 4-7.

damage to Petitioners' cultural values. Given the operational history of ISL mines, the only way to prevent contamination to groundwater and soil from the proposed ISL mine would have been to deny HRI's license application. By failing to do so, the United States has failed to meet its obligations under the American Declaration.

IV. CONCLUSION

The aim of human rights law is to protect and preserve the inherent dignity each of us possesses as human beings. This goal extends, in the case of Indigenous peoples, to collective rights in addition to individual rights. Tragically, the United States has lost sight of this fundamental principle – a failing of both respect for the rule of law and of morality. The State's issuance of HRI/NuFuels' license to mine uranium in Crownpoint and Churchrock represents just the latest degradation that has resulted from the State's decades-long uranium development policy on Indigenous lands. The State's policy has not only destroyed physical resources, but by destroying those resources has also destroyed Navajo cultural identity. Diné cultural beliefs, practices and expression are indivisible from the elements in Dinétah. To be Navajo is to know your relationship to all the Universe. Thus, by destroying land, air and water, the uranium mining industry, facilitated by U.S. Government policy, has diminished the Diné as a people. As Mr. Perry asks: "if these areas should become contaminated, if these water resources are no longer available to us, where do we go? Do we still have a home? Do we still identify ourselves as Náhookáh Díyin Diné?"

V. REQUEST FOR RELIEF

United States government action to rescind HRI/NuFuels' source and byproduct materials license, SUA-1580, and to systematically and meaningfully address contamination from historic uranium mining and milling would substantially remedy the violations discussed herein and in Petitioners' Petition. As such, Petitioners respectfully request that the Commission:

1. Hold a hearing at the earliest opportunity investigating the merits of the Petition in this matter;

2. Hold a thematic hearing at the earliest opportunity investigating the United States' failure to systematically address ongoing contamination from historic uranium mining and milling within the Navajo Nation and throughout the United States where uranium mining has occurred;

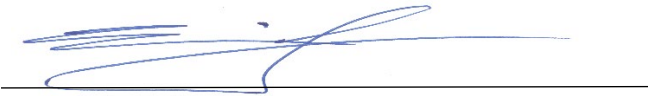
3. Prepare a report setting forth all the facts and applicable law, declaring that the United States' action of issuing a source and byproduct materials license to HRI/NuFuels to conduct uranium solution mining in Crownpoint and Churchrock, Navajo Nation, New Mexico violates rights guaranteed in the American Declaration on the Rights and Duties of Man, and recommending that the United States:

- a. Rescind or not renew HRI/NuFuels' source and byproduct materials license, SUA-1580;

- b. Acknowledge and respect the sovereign laws of the Navajo Nation, in particular the Diné Natural Resources Protection Act, 2 N.N.C. § 3580, when evaluating uranium mining related projects within the Navajo Nation and Navajo Indian Country;
- c. Revise federal policies to ensure that Diné cultural views, practices, beliefs, and expression are prioritized in uranium development evaluations on land that is outside the Navajo Nation, but that has been historically used and occupied by the Diné (Dinétah), consistent with international human rights treaties, mechanisms and norms;
- d. Purchase or condemn the mineral rights to the minerals to be mined for the Crownpoint Uranium Project and any other mineral rights that, if developed, would impact the Navajo Nation, Navajo Indian Country, or lands that have been historically used and occupied by the Diné (Dinétah) and ensure those minerals are never developed;
- e. Create and implement a systematic and comprehensive policy to fully remediate historic uranium mining and milling waste and natural resource damage that has resulted from such waste within the Navajo Nation and Navajo Indian Country and to dispose of such waste outside the Navajo Nation, Navajo Indian Country and lands that have been historically used and occupied by the Diné (Dinétah), consistent with international human rights treaties, mechanisms and norms;

f. Conduct, in partnership with the Navajo Nation and affected communities, a comprehensive environmental assessment of all the resources that have been affected by historic uranium mining and milling.

Respectfully submitted this 21st day of October 2021, on behalf of Petitioners by:



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DECLARATION OF DR. RICHARD ABITZ

My name is Richard J. Abitz. My education and experience as a professional geologist are described in my vita, attached to this testimony as **Exhibit A**. I have a Doctor of Philosophy in geology (emphasis in geochemistry) from the University of New Mexico and over 30 years of experience as an environmental consultant dealing with problems associated with the solubility and mobility of hazardous and radioactive elements in the sediment/water environment of major aquifers.

I presently serve as the director of the Environmental Restoration (ER) Group for the Idaho Closure Project contract at the Department of Energy's (DOE) Idaho National Laboratory Site. The ER Group is an organization of 20 scientists, engineers, and technicians who are responsible for executing groundwater and soil remedial actions to protect human health and the environment, as established in the Record of Decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (42 USC § 9601 et. seq.). The primary actions are to 1) remediate and monitor groundwater contaminated by solvents and radioactive isotopes, 2) inspect and maintain established environmental controls at legacy sites where remedial actions removed contamination, and 3) prepare annual reports on the progress of remedial actions.

My experience also includes years of work with uranium contamination in the surface environment and groundwater at the DOE Portsmouth and Fernald Sites. At the Portsmouth Site, which produced low enriched uranium for commercial power plants and highly enriched uranium for weapon components and Navy ship reactors, I served as the senior scientist responsible for dose calculations to assess the risk to human health associated with exposure to uranium and other radionuclide isotopes under present conditions and a future condition where all contamination was buried in an on-site disposal facility. At the Fernald Site, which processed uranium ores and yellow cake for over 30 years (1952 to 1985) to produce uranium metal for plutonium production reactors at the Hanford and Savannah River Sites, I managed the Environmental Services Division for the Fernald Closure Project. Our division was responsible for 1) installation and development of monitoring, extraction, and injection wells, 2) air, water and soil sampling activities, 3) analytical facilities for the measurement of radionuclides, metals, and organic compounds in soil and water samples, 4) *in situ* measurements of ^{226}Ra , ^{232}Th , and ^{238}U activities in soil using sodium-iodide and high-purity germanium detectors, 5) data verification, validation, and reporting, and 6) data analysis, modeling, and reporting.

In addition to work at DOE sites, I have served as a subcontractor to the Environmental Protection Agency (EPA) in support of groundwater remediation at the Homestake uranium tailings site north of Milan, NM. For the Navajo Nation (New Mexico), Sioux Nation (Nebraska), Goliad County Groundwater Conservation District (Texas), and National Resources Defense Council, I served as a technical expert and witness to evaluate the impact of proposed *in situ* uranium leach mining on community groundwater supplies. I have also provided technical input to the Wyoming Powder River Basin Resource Council's comment responses to EPA's proposed Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192).

Based on my geology education and environmental work experience, I have extensive theoretical, laboratory, and field knowledge on 1) the solid forms of uranium in aquifer sediments; 2) the chemical reactions that are responsible for the mobilization and/or adsorption/precipitation of uranium from groundwater systems; 3) well fields and ion-exchange operations associated with recovering

groundwater that is contaminated with uranium; and 4) the Church Rock and Crownpoint uranium deposits in the Westwater Canyon Member of the Morrison Formation.

I will demonstrate through my testimony the difficulties of restoring groundwater quality in an aquifer that has been subject to *in situ* leach ("ISL") uranium mining. I will also show, by considering the activity ratio of uranium isotopes in water, that after an aquifer has been subject to ISL mining, the risk of high concentrations of uranium and other heavy metals spreading throughout large portions of the aquifer is significant.

The information in the following declaration is true and accurate to the best of my knowledge. I am making the following declaration under penalty of perjury under the laws of New Mexico and the United States.

Uranium

Naturally occurring, elemental uranium is composed of three radioactive isotopes: uranium-238 (U-238), uranium-235 (U-235), and uranium-234 (U-234). The isotopes are part of two radioactive decay chains: uranium series (U-238 and U-234) and actinium series (U-235). Nominal mass fractions of natural uranium are reported as 99.2742 % U-238, 0.7204% U-235, and 0.0054% U-234 (Brookhaven National Laboratory, NuDat 2.8).

In water and rocks associated with the continental crust (such as are present in Crownpoint and Churchrock, New Mexico) and oceanic crust, uranium exists in two oxidation states (U^{+4} and U^{+6}); most often as an ion or mineral, but never in the metallic state (U^0). The two uranium oxidation states indicate that 4 and 6 electrons are missing from the uranium atom or the electrons are being shared with other elements, most commonly oxygen, to form solids (e.g., UO_2 ; U^{+4} oxidation state) or aqueous ions (e.g., UO_2^{+2} ; U^{+6} oxidation state). The oxidation state depends on the amount of oxygen in the fluid and gas that is in contact with the uranium. For example, most rocks and uranium minerals contain uranium in the lower oxidation state (U^{+4}). Rocks with uranium or uranium minerals in contact with the atmosphere, rain, streams, and near surface groundwater, where oxygen is abundant, will slowly react with oxygen and the uranium will transition to the higher oxidation state (U^{+6}) and be mobilized in streams or groundwater as the uranyl ion (UO_2^{+2}) or uranyl-carbonate ions [$UO_2(CO_3)_2^{-2}$ or $UO_2(CO_3)_3^{-4}$]. In sum, uranium in its higher oxidation state moves and spreads more readily in the environment.

The New Mexico Bureau of Geology and Mineral Resources reports uranium concentrations in rocks vary from approximately 2 micrograms per gram (ug/g) in an average sedimentary rock to over 200 ug/g in volcanic rocks or black shale (NMBGMR, <https://geoinfo.nmt.edu/resources/uranium/where.html>). They also report that most uranium ore deposits contain uranium in the range of 1,000 to 20,000 ug/g. Rocks exposed to rain or streams will slowly lose uranium as the oxygen-rich fluid reacts with uranium to transition it to a higher oxidation state and leach it from the rock as the uranyl ion. Surface water containing the uranyl ion infiltrates below the surface to become groundwater.

Most uranium ore deposits in the western United States form in groundwater redox zones, which is an oxygen transition zone where the reduction in the amount of oxygen in the groundwater leads to a gain of electrons by the uranium atom (i.e., U^{+6} transitions to U^{+4}) and uranium minerals are precipitated (e.g., uraninite) to form an ore deposit.

Uranium In Situ Leach (ISL) Mining

In the ISL mining process, thousands of exploration boreholes are drilled down to the groundwater horizons containing the uranium ore deposits to identify the zones with uranium concentrations that are economical to recover. The exploration process contaminates the aquifer when it encounters uranium ore deposits because the drilling is generally done with fluids that contain oxygen at sufficient levels to oxidize the uranium and release it to groundwater as the uranyl ion. Because exploration drilling for uranium contaminates the aquifer, baseline water quality should be established with randomly placed water wells over the exploration acreage prior to drilling thousands of exploration boreholes. However, NRC regulations are woefully inadequate for establishing a sound scientific background for groundwater quality and mining companies are allowed by NRC to establish 'baseline' water quality after the aquifer has been contaminated by exploration drilling and the drilling of injection and recovery wells.

After the economic ore zones are identified, hundreds of water wells are drilled into the uranium ore deposits to establish the injection wells and recovery wells. The wells are drilled and developed using oxygen rich waters that release uranium, radium, arsenic, and other contaminants into the groundwater. The NRC regulations allow the mining companies to sample the injection and recovery wells for 'baseline' water quality to establish restoration values for the surrounding aquifer, which biases the results to high levels of uranium, radium, arsenic, and other contaminants mobilized by the drilling events. Other regulatory programs in the United States (e.g., CERCLA and RCRA; EPA 2009) provide guidelines for sound scientific and statistical principles to locate and sample wells that are representative of true baseline groundwater quality.

ISL mining is executed using a solution of water containing dissolved oxygen and sodium bicarbonate — called *lixiviant* — that is pumped under pressure (injected) into the uranium-ore zones of the formation. The oxygen reacts with the rock and oxidizes uranium as the solution flows through it; the sodium bicarbonate releases carbonate ions (CO_3^{2-}) to the groundwater and the carbonate ions act as a collection agent that strips the uranyl ions from the sand grains of the rock. In aqueous solutions, the uranyl ion has a high chemical affinity for the carbonate ion and forms uranyl carbonate complexes [$\text{UO}_2(\text{CO}_3)_2^{2-}$ and $\text{UO}_2(\text{CO}_3)_3^{4-}$]. The anionic (negatively charged) uranyl carbonate complexes are highly mobile due to less adsorption to the aquifer sediment grains and the resulting uranium-laden solution — called *pregnant lixiviant* — is pumped to the surface for separation and concentration of the uranium into its oxide form.

The key fact is that, for ISL mining to work, the process *must deliberately contaminate* the aquifer with enough uranium to make mining financially feasible. Uranium concentrations in the pregnant lixiviant are generally one thousand times higher than the statistically invalid 'baseline' the NRC allows the mining companies to establish, and 10,000 to 100,000 times higher than a true baseline for the aquifer. In addition, injection of lixiviant also increases groundwater concentrations of radium, arsenic, selenium, and potentially other heavy metals and radionuclides that are hazardous to human health. As discussed by Deutsch et al (1984), Staub et al (1986), and Hall (2009), after ISL mining contaminates the groundwater, it has never been restored to pre-mining, statistically invalid 'baseline' water quality and it is common for contaminated groundwater to migrate down gradient beyond the controlled mining area.

Uranium Isotope Activity Ratios

High concentrations of uranium and uranium activity ratios can be used to identify ISL mining fluids that have moved beyond the mining area¹ to contaminate groundwater that meets EPA drinking water standards. If excursions cannot be definitively identified by uranium concentrations associated with ISL mining fluids, the U-234/U-238 activity ratio can be analyzed to determine if an excursion has taken place. The activity of a radioactive isotope is determined by the half-life rate for the isotope. The half-life represents the amount of time, on average, for one-half of the initial parent atoms to decay to daughter atoms. Isotopes with a short half-life have higher radioactivity relative to isotopes with a long half-life. The U-238 decay chain contains radioactive isotopes with half-life values that range from billions of years to less than a minute.

The first part of the U-238 decay chain produces uranium-234 (U-234), after thorium-234 (Th-234) and protactinium-234m (Pa-234m) decay.

Equation 1. $\text{U-238} \rightarrow \alpha \text{ particle} + \text{Th-234} \rightarrow \beta \text{ particle} + \text{Pa-234m} \rightarrow \beta \text{ particle} + \text{U-234}$

The half-lives for the nuclides are 4,470,000,000 years for U-238, 24.1 days for Th-234, 1.17 minutes for Pa-234m, and 246,000 years for U-234. As the U-234/U-238 activity ratio is of interest for us to monitor uranium ISL mining excursions, we will focus on calculating the activity ratio for U-234/U-238 in natural uranium. Note that the half-life for U-234 is about 20,000 times shorter than U-238 (i.e., the radioactivity of U-234 >> U-238)

As noted above the average mass fractions (not activity ratios or “AR”) of natural uranium are reported as 99.2742 % U-238, 0.7204% U-235, and 0.0054% U-234 (BNL, <https://www.nndc.bnl.gov/nudat2.html>), and the specific activities of the isotopes are 1.24E+04 Becquerel per gram (Bq/g) U-238, 8.00E+04 Bq/g U-235, and 2.31E+08 Bq/g U-234 (WISE, <https://www.wise.uranium.org/nucv.html>). If the mass fractions are taken as grams, multiplying the grams of each uranium isotope by its specific activity yields activities of 1.23E+06 Bq U-238, 5.76E+04 Bq U-235, and 1.25E+06 Bq U-234. Therefore, natural uranium ore deposits will have a U-234/U-238 activity ratio near one (i.e., 1.25E+06 Bq/1.23E+06 Bq).

U-234/U-238 Activity Ratios in Groundwater

Sandstone aquifers are commonly recharged where the sandstone formation is exposed on the present topographic surface. As the ancient sandstone formations experienced tectonic forces over the millions of years since deposition, the sandstone beds were uplifted and tilted and now dip into the subsurface as one traverses away from the surface exposure area. Therefore, precipitation falling in the exposure area infiltrates into the sandstone formation and begins to migrate down the dip of the sandstone bed as groundwater. This is commonly referred to as aquifer “recharge.”

The initial precipitation is rich in oxygen, and as the groundwater moves deeper into the subsurface the oxygen is slowly consumed by reactions with organic and inorganic solids that comprise the sandstone. If uranium is disseminated as grain coatings or minerals (e.g., coffinite or uraninite) within the sandstone rock, the oxygen-rich groundwater will slowly dissolve the uranium by oxidizing the uranium in the solid to the uranyl ion, which migrates with the groundwater down the hydrologic gradient (i.e., down dip).

¹ The uranium mining industry and regulators call mining fluids that have moved outside the mining area “excursions.”

Measurement of U-234/U-238 ARs in aquifer samples has shown a range of 0.5 to 15 (Coward and Osmond, 1977; and references therein). The variation of the U-234/U-238 AR from its expected natural value of one is attributed to (1) selective leaching of U-234 atoms from the solid, (2) the direct alpha recoil of Th-234 across a grain boundary, and (3) a combination of the two processes (Coward and Osmond, 1977).

Selective leaching of U-234 occurs due to lattice damage in the solid induced by alpha recoil during radioactive decay of the U-238 parent. Ejection of Th-234 from the solid to the fluid has been observed in the laboratory (Coward and Osmond, 1977), and it is considered an important mechanism to fractionate U-234 from U-238 in the natural environment (Note: Th-234 is injected into the fluid, but it quickly decays to Pa-234m, which in turn rapidly decays to U-234).

The result of selective leaching of U-234 and Th-234 ejection is an increase in the U-234/U-238 AR of groundwater as water continues to migrate deeper into the aquifer over time. These fractionation mechanisms can also produce lower U-234/U-238 ARs in uranium ore deposits as the U-234 is selectively removed from the ore over long time periods.

In the Carrizo, Texas sandstone aquifer, where there are no known uranium ore deposits, Coward and Osmond (1977) noted the highest uranium concentrations (up to 0.0035 mg/L) and lowest U-234/U-238 AR (0.58 to 1.16) were found in the recharge zone where the sandstone is exposed on the surface (i.e., outcrop area). This reflects the oxygen rich precipitation infiltrating into the sandstone and actively leaching uranium from the rock. The U-234/U-238 AR may decrease over time in the groundwater recharge zone as U-234 is preferentially extracted from the rock by groundwater. After the groundwater is depleted of its oxygen down dip from the outcrop area, the aquifer becomes reducing (a low oxygen environment is a reducing environment) and uranium concentrations were measured as less than 0.001 mg/L and U-234/U-238 ARs ranged from 1.77 to 8.70. The lower uranium concentrations are due to the lower solubility of uranium under reducing conditions, and the higher ARs in the aquifer reducing zone occur because selective leaching of U-234 and ejection of Th-234 are not impacted by reducing conditions and they continue to partition to groundwater along the flow path.

U-234/U-238 Activity Ratios in Uranium Ore Deposits

Basu et al (2015) obtained uranium ore from an unmined area (called "PAA 4") at an ISL site in Rosita, Texas² and sampled four discrete depths with the highest uranium levels, as determined by prompt fission neutron measurements. Ore samples had total uranium concentrations from 38 to 250 ug/g and U-234/U-238 AR values ranged from 0.69 to 0.82.

Brown et al (2016) analyzed sediment samples from the top of the ore zone in Mining Unit 4 (called "MU4") at the Smith Ranch-Highland ISL site in Wyoming, and they reported total uranium values of 1,383 to 24,840 ug/g and U-234/U-238 AR values from 1.16 to 1.28. AR values in the lower ore zone were cited to be as low as 0.65, so the values above one in the upper ore zone may indicate re-precipitation of uranium minerals from groundwater with high U-234/U-238 AR.

Denton et al (2016) obtained drill core and fracture samples from the Nopal I uranium deposit in northern Mexico. They measured uranium concentrations of 1,032 to 7,635 ug/g in the drill core

² HRI's former parent company, Uranium Resources, Inc., (now called enCorp Energy Corp.) operated the Rosita, Texas ISL mine.

samples and 13 to 1,304 ug/g in the fracture samples. Measured U-234/U-238 ARs varied from 0.6642 to 2.439 for drill core samples (obtained during exploration drilling) and 0.9434 to 1.487 for fracture samples (samples from natural rock fractures). Nine of eleven drill core samples had U-234/U-238 AR less than 1.13, with two samples reported at 1.465 and 2.439. For the fracture samples, 21 of 22 samples had U-234/U-238 AR less than 1.22, and a single sample was measured at 1.487. Some higher U-234/U-238 AR values in the ore are thought to represent recent mobilization and re-precipitation of uranium minerals.

Most of the ore samples in the above studies had U-234/U-238 AR values around one or less than one, and these lower AR values can be used to trace the migration of ISL mining fluids when the groundwater AR values are shown to be greater than the ore samples or mining fluids.

Measurement of U-234/U-238 Activity Ratios in Sandstone Aquifers at Uranium Mining Sites

Coward and Osmond (1977) studied uranium concentrations and U-234/U-238 AR in sandstones associated with uranium ore in the Powder River and Shirley Basins, Wyoming, and Karnes County, Texas. Note that the studies were carried out prior to ISL mining in the region, so there had been no extensive oxidation of the ore deposits by lixiviant (i.e., groundwater fortified with oxygen and carbonate ions that is injected into the aquifer at ISL uranium mine sites).

In the sandstone aquifers hosting uranium ore deposits (i.e., Powder River and Shirley Basins, Wyoming; Karnes County, Texas), Cowart and Osmond (1977) noted that the Wyoming deposits are in the reducing zone of the aquifer and higher uranium concentrations and lower U-234/U-238 ARs were measured in the oxidized zone upgradient from the ore and lower uranium concentrations and higher U-234/U-238 ARs were measured in the reducing zone downgradient from the ore (see open triangles and squares on Figure 1). The uranium ore at the Karnes County site is presently in the transition zone between the oxidizing and reducing zones of the aquifer, and four samples showed a range of uranium concentrations comparable to Highland (Powder River Basin) water samples from the ore zone (solid triangles and circles on Figure 1). Lower U-234/U-238 values for the Karnes County samples, relative to Highland samples (Figure 1), may indicate lower U-234/U-238 ARs in the ore at the Karnes County site. Note that the aquifer water quality samples from the ore zones around conventional mines (prior to ISL mining) are below or slightly above the United States EPA Maximum Contamination Level³ (MCL) for drinking water.

Basu et al (2015) investigated uranium concentrations at the ISL uranium mining operation in Rosita, Texas, where three of the four production area authorizations (PAA) had been mined. Figure 2 summarizes the reported data and shows uranium concentrations above approximately 0.04 mg/L have U-234/U-238 AR values less than one. This observation led Basu et al (2015) to note that high uranium concentrations and U-234/U-238 ARs less than one could be used to trace the migration of mining fluids. Therefore, the large number of samples with concentrations that exceed the EPA uranium MCL of 0.03 mg/L for drinking water (Figure 2) reflects the migration of the mining fluid to some of the monitoring wells. Two of the ore zone samples have low uranium values because one of the samples is from PAA 4 (low U-234/U-238 AR), which has not been mined, and the other is located slightly upgradient from the ore where fresh groundwater enters PAA 3 (high U-234/U-238 AR).

³ Maximum Contamination Levels or “MCLs” are the concentrations of certain contaminants at or below which the U.S. EPA has determined are safe for human consumption. See, 40 C.F.R. §§ 141.11 et. seq.

Brown et al (2016) examined uranium isotopes at the MU4a monitor well ring and ore zone at the Smith Ranch-Highland ISL site in Wyoming, which was mined between 1999 and 2005. Sample events in 2012, 2013, and 2014 took place during active pumping of recovery wells to maintain negative hydraulic pressure and restrict down gradient migration of ore zone fluids. Figure 3 summarizes the reported data and shows samples from the monitoring well ring (18 of 27 wells sampled) had uranium concentrations equal to or less than 0.03 mg/L and U-234/U-238 ARs from 2.3 to 5.7. Down gradient monitoring wells had variable AR values from 2.3 to 4.8, while the AR values in up gradient monitoring wells were 5.1 to 5.7. This observation suggests that lower AR values down gradient of the ore zone may have some small component of ore zone fluid. Two groundwater samples were obtained from ore-zone wells in MU4 and MU4a, with reported results for uranium and U-234/U-238 AR of, respectively, 19.2 mg/L and 0.97 (MU4) and 58.3 mg/L and 1.11.

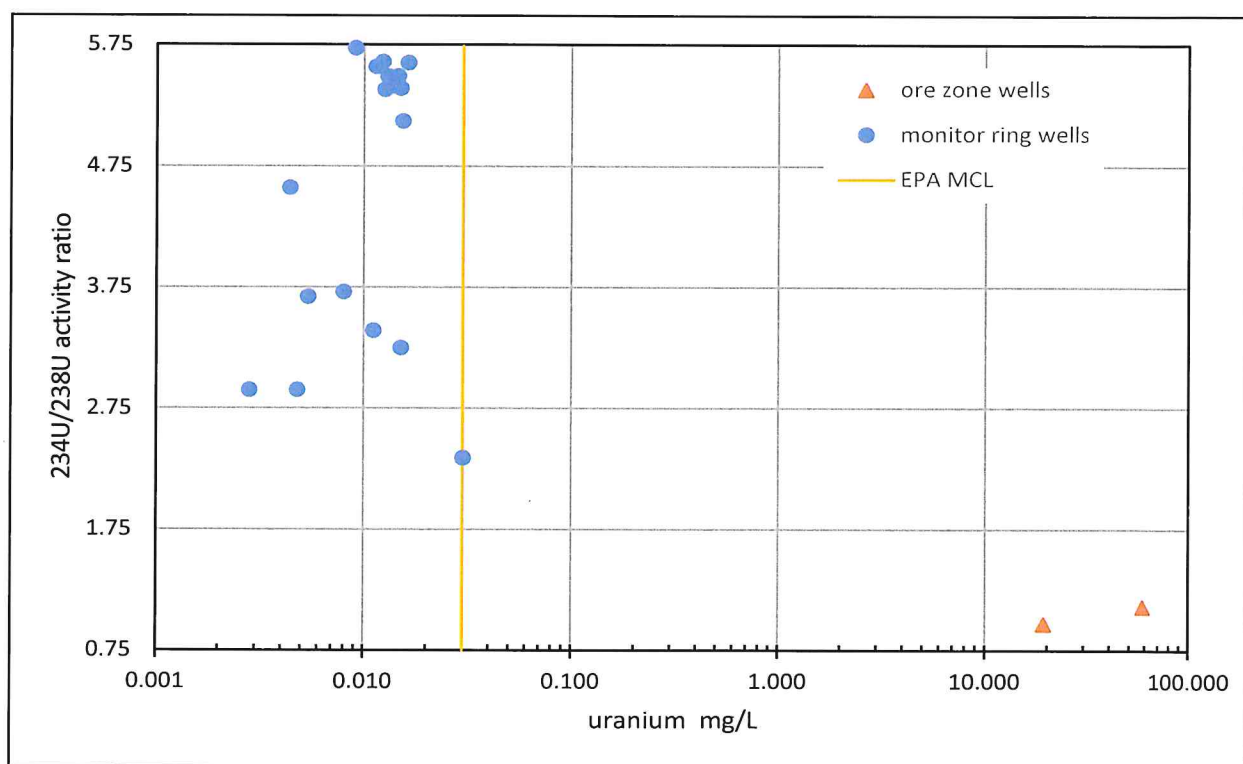


Figure 1. Groundwater samples collected from wells at conventional uranium mining sites. Open symbols are from oxidized groundwater upgradient of the ore (low U-234/U-238) and solid symbols are down gradient from the ore in the reducing zone of the aquifer. Data from Cowart and Osmond (1977).

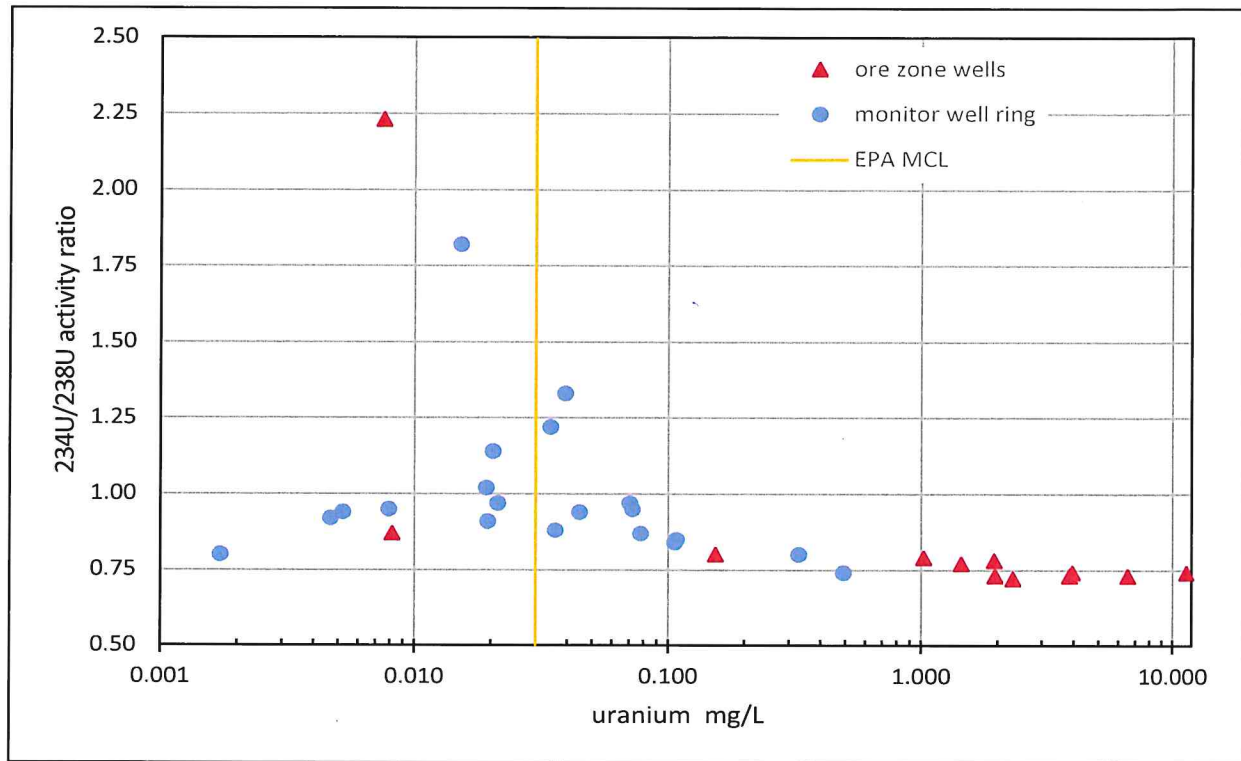


Figure 2. Groundwater samples collected from wells at the Rosita ISL site, TX. Data from Basu et al (2015).

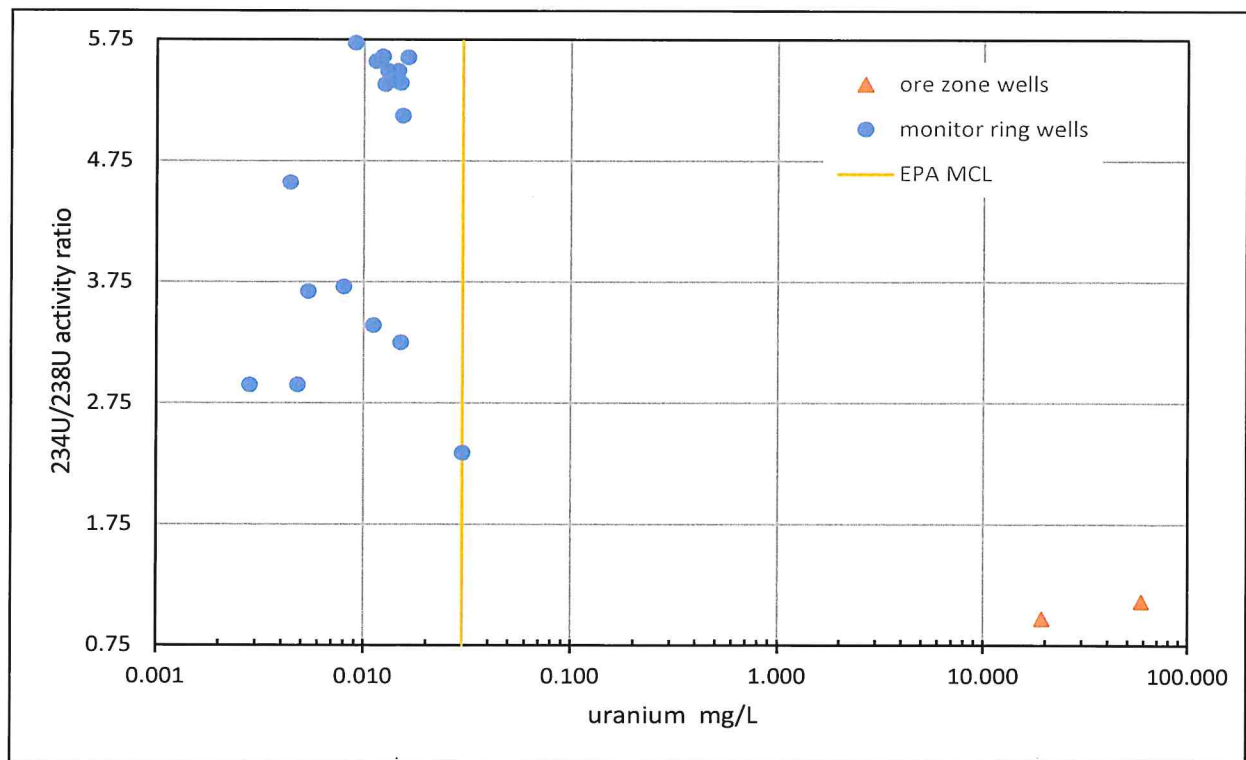


Figure 3. Groundwater samples collected from wells at the Smith Ranch-Highland ISL site, WY. Data from Brown et al (2016).

At Kingsville Dome (KVD), Texas, ISL uranium mining occurs in the Goliad Sandstone (Miocene age) and operations have been intermittent over the past 30 years. The City of Kingsville, located approximately four miles north-northwest of the northwest boundary of the KVD ISL operation, pumps a large volume of water for municipal use from the Goliad Sandstone and the cone of depression (i.e., depletion of groundwater around the well) produced in the aquifer creates a groundwater hydraulic gradient (i.e., flow direction) that is southeast to northwest across the KVD ISL site (i.e., groundwater flows from the KVD ISL site towards the City of Kingsville). Regionally, the hydraulic gradient is northwest to southeast toward the Gulf of Mexico.

Uranium Resources International (URI, now enCore Energy Corp.) controls the KVD ISL operation (PAA 1, PAA 2, PAA 3) and their in-house analytical laboratory reports quantified uranium concentrations in groundwater at the monitor ring wells only if the sample exceeds 1 mg/L (EPA drinking water MCL is 0.03 mg/L). All monitor wells with uranium concentrations less than 1 mg/L are reported as <1 mg/L. Rice (2013) documented the migration of mining fluids to and beyond the monitor ring wells at the URI PAA 3 (referred to as an excursion by the ISL mining industry). Figure 4, from Rice (2013), shows the monitor wells where uranium values were measured above 1 mg/L (red circles) and those reported as <1 mg/L (yellow circles). Table 1 summarizes uranium 'baseline' values (1997) and monitoring results (2007) for wells along the northwest boundary of the PAA 3 monitor well ring shown on Figure 4.

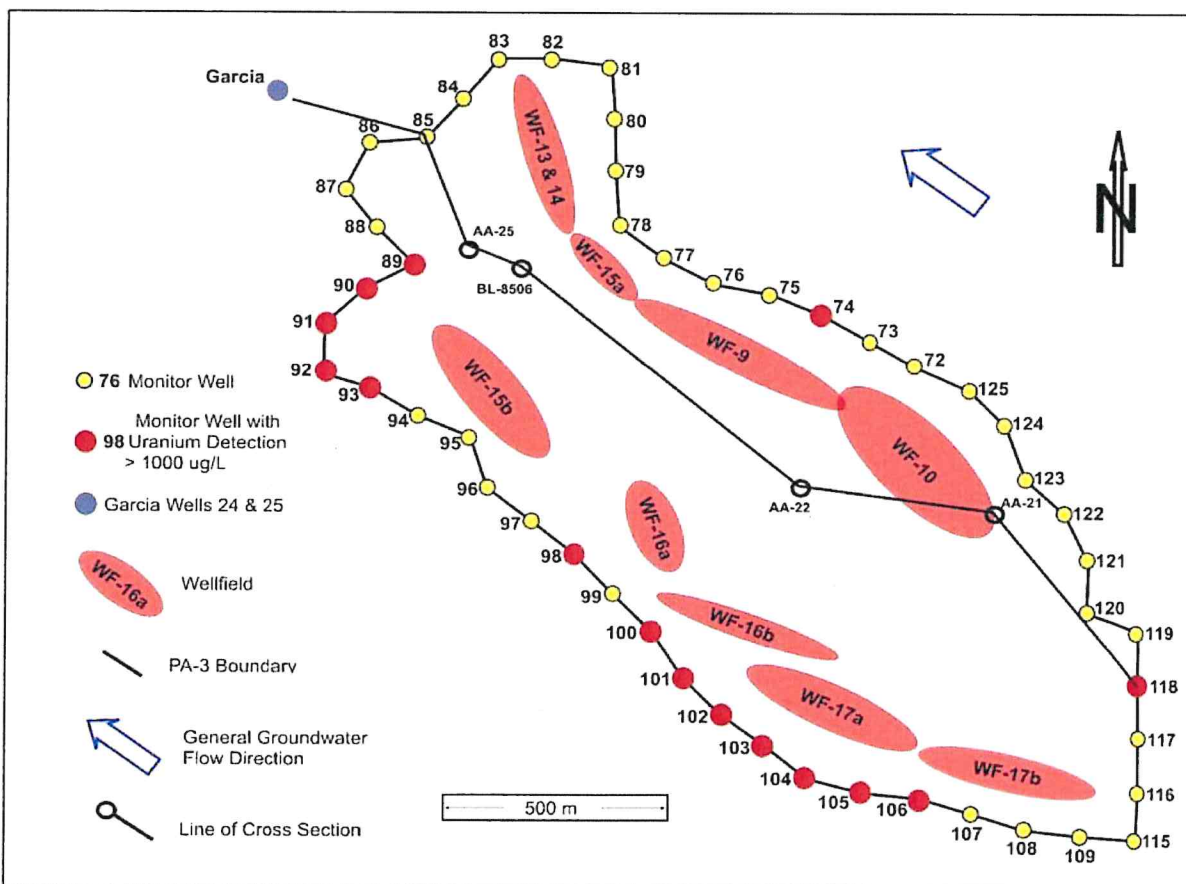


Figure 4. PAA 3 at the ISL KVD site, TX (from Rice, 2013). The Garcia well is approximately 1,000 ft northwest of Monitor Well 86. (Note that PAA 2 and PAA 1, not shown, are located to the southeast of PAA 3)

Table 1. 'Baseline' and 2007 uranium values for wells along the northwest boundary of PAA 3, KVD, TX.

Monitor Well	'Baseline' Results ^a		Monitoring Results ^b	
	Sample Date	U (mg/L)	Sample Date	U (mg/L)
85	4/11/97	0.018	8/17/07	<1
86	4/7/97	0.019	8/17/07	<1
87	4/9/97	0.025	8/17/07	<1
88	4/9/97	0.026	8/17/07	<1
89	4/10/97	0.022	8/17/07	1.69
90	4/10/97	0.024	8/17/07	1.32
91	4/10/97	0.031	8/17/07	2.14
92	4/10/97	0.036	8/17/07	1.67

^aAnalytical results reported by Jordan Laboratories

^bAnalytical results reported by Uranium Resources International (Note the <1 reporting limit by the URI lab is a result of the NRC allowing the invalid 'baseline' for uranium in the ore zone groundwater to be reset to higher restoration values above 1 mg/L)

U-234/U-238 AR values and uranium concentrations are available for seven wells (City of Kingsville, Garcia, Garza-2 wells, Hinojosa, Woelfel, Perez) in the vicinity of the KVD ISL operations (Figure 5). A municipal well for the City of Kingsville is located about four miles to the northwest of PAA 3, and the Garcia well (Figure 4) is approximately 1,000 ft northwest of PAA 3. The Garza wells are about 1,500 ft to the west of the Garcia well, and the Hinojosa well is about 1,500 feet north of the Garcia well. Wells for the Woelfel and Perez families are approximately 2.5 miles northwest and 3.25 miles southeast of the Garcia well, respectively. The Perez well is immediately south of the southeast boundary of the KVD ISL operation (PAA 1 ISL well fields).

Low uranium concentrations and high U-234/U-238 AR values for the City of Kingsville, Garza, Hinojosa, Woelfel, and Perez wells reflects background conditions for aquifer areas not impacted by ISL mining fluids. Although the Perez well is closer to the KVD ISL operation than the Garcia well, it is not impacted by the mining fluids because it is up gradient from the KVD ISL site (i.e., groundwater flows from the Perez location toward PAA 1 of the KVD ISL operation). For the Garcia well, the high uranium concentration and low U-234/U238 AR is consistent with the migration of mining fluid beyond the KVD monitor ring wells to the Garcia well, as observed by Rice (2013) for samples from KVD PAA 3 monitor ring wells (Table 1). Similar trends in uranium and AR values are observed in aquifer samples from the monitor wells at the Rosita, TX, ISL mining site (Figure 2), which indicates migration of mining fluid beyond the monitor well ring.

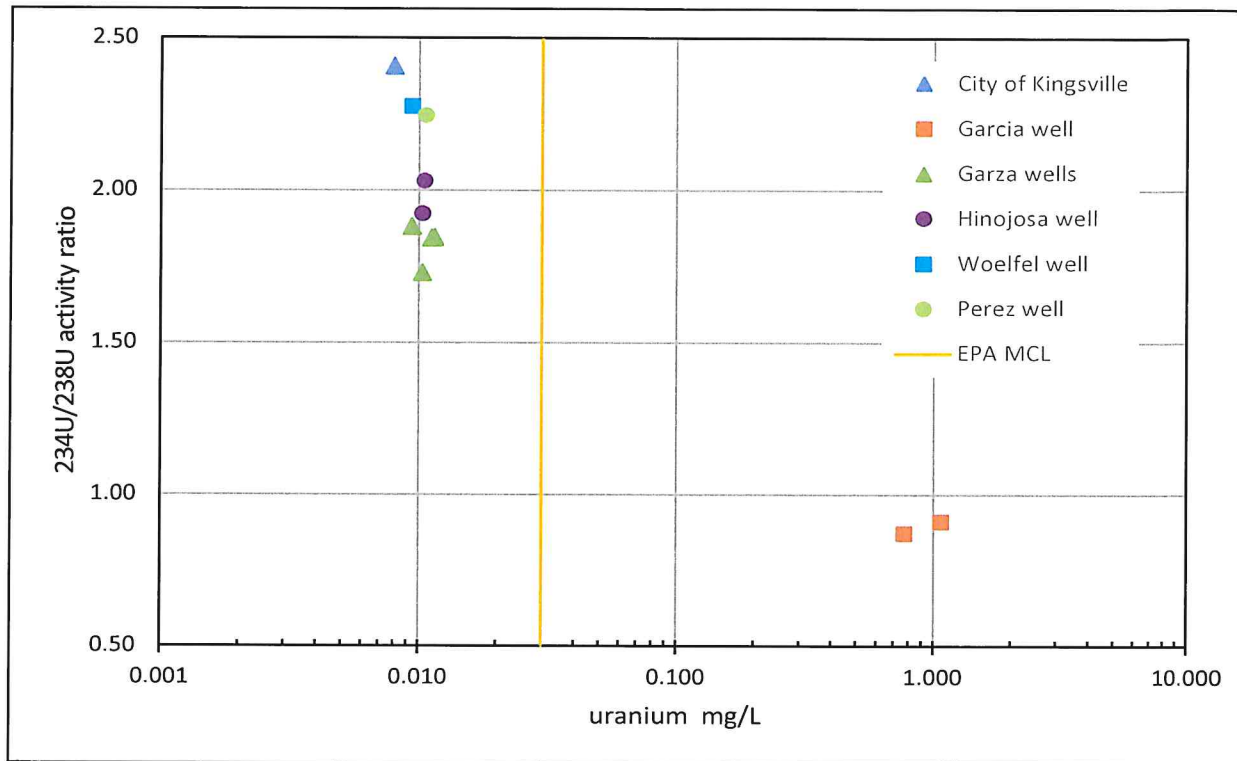


Figure 5. Groundwater samples collected at private wells outside the monitor well rings at the KVD ISL site, TX. Analytical results reported by the Texas Department of State Health Services and the City of Kingsville. Sample dates: Garcia, 2007, 2012; Hinojosa & Garza, 2012, 2018; Woelfel & Perez, 2018; City of Kingsville, 2012.

Summary

Measurements of uranium concentrations and U-234/U-238 ARs in groundwater from uranium ISL sites indicate high uranium concentrations and AR values near one or lower can be used to trace the migration of mining fluids to and beyond the monitor ring wells. High uranium concentrations and U-234/U-238 ARs, near one or lower, measured in groundwater at the monitor ring wells around ISL operations at the Rosita, TX site (Figure 2) show that mining fluids have migrated to the monitor ring and beyond. At the KVD ISL site, high uranium concentrations at the northwestern boundary of the monitor ring wells reveal that mining fluid has migrated to and beyond the monitor ring for PAA 3 (Figure 4 & Table 1). The Garcia well, a private well northwest of the KVD ISL operation (Figure 4), has a U-234/U-238 AR near one and high uranium concentrations relative to other wells in the area that are not impacted by the mining fluid (Figure 5), which confirms that mining fluid impacted the Garcia well. Lower uranium concentrations and higher AR values for the down gradient monitor ring wells at the Smith Ranch-Highland ISL site (Figure 3) indicate restoration controls are more rigorous and effective in Wyoming, relative to the Rosita and KVD sites in Texas.

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DATED: 9 Oct 2021


Richard J. Abitz, Ph.D

Professional Qualifications

Dr. Abitz is a geologist and project director with over thirty years of experience in the environmental services sector of private and government organizations. His broad experience encompasses project and personnel management, analysis of chemical and radiological data, modeling of soil/water systems and radioactive waste streams with experimental methods and computer codes, human-health risk assessment, dose assessment for low-level waste disposal facilities, and development of remedial work plans for CERCLA and RCRA sites. Dr. Abitz applies his experience and expertise to managing multidiscipline project teams seeking solutions to problems with the mobility of hazardous and radioactive elements in the environment. His teams provide solutions in the form of calculations on human-health risk and radiation dose to workers and the public potentially exposed to contaminants in air, soil and water media, recommendations on remediation techniques for water and soil contaminated by hazardous and radioactive wastes, compliance with monitoring programs, and the preparation of technical reports.

Presently, Dr. Abitz serves as the director for the Environmental Restoration (ER) organization at the DOE Idaho National Laboratory (INL) site. In this capacity, he is responsible for mentoring personnel and the safe and efficient management of ER contract work scope for the Idaho Cleanup Project (ICP). His previous position at the ICP was deputy director and senior technical consultant for the ER organization. The ER organization is tasked with monitoring, risk assessment, and reporting requirements associated with CERCLA remedial actions executed across the INL site.

In his previous position as senior technical consultant for the Environmental Remediation project at the DOE Portsmouth site, he was responsible for preparation and oversight of documents associated with CERCLA and DOE Order 435.1 regulations; and was the control account manager for the analytical laboratory and soil projects. Dr. Abitz prepared the DOE Order 435.1 Performance Assessment and Composite Analysis for the Portsmouth on-site waste disposal facility (OSWDF), which assessed radionuclide dose risk to human health from exposure to uranium and other radionuclide isotopes. He was a key player in obtaining the Disposal Authorization from DOE HQ for the design and construction of the OSWDF.

Dr. Abitz also has extensive experience at other DOE sites, including Savannah River, Fernald, Los Alamos National Laboratory, and the Waste Isolation Pilot Plant. Dr. Abitz served with the Savannah River National Laboratory as the DOE EM13 program manager for the development of technologies to support the *in situ* decommissioning of highly contaminated nuclear facilities. At the Fernald site, Dr. Abitz managed the Environmental Services Group and was a senior consultant to the DOE Technology Development Program. For Los Alamos National Laboratory, he developed waste analysis and radioactive material management plans for transuranic and low-level mixed wastes generated, treated, and stored on site. At the Waste Isolation Pilot Plant, Dr. Abitz directed geochemical studies that evaluated the composition and origin of brine and saline groundwater in the repository and overlying strata.

In addition to work at DOE sites, Dr. Abitz served as an EPA subcontractor supporting groundwater remediation at the Homestake uranium tailings site north of Milan, NM. For the Navajo Nation (New Mexico), Sioux Nation (Nebraska), Goliad County Groundwater Conservation District (Texas), and National Resources Defense Council he served as a technical expert and witness to evaluate the impact of proposed *in situ* uranium leach mining on community groundwater supplies. Dr. Abitz also provided technical input to the Powder River Basin Resource Council's comment responses to EPA's proposed

Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192).

Education and Training

B.A., Geology, Humboldt State University, Arcata, California; 1981

M.S., Geology, University of New Mexico, Albuquerque; 1984

Ph.D., Geology, University of New Mexico, Albuquerque; 1989

EQ3/6 Geochemical Modeling Short Course, San Diego, CA; 1991

Environmental Risk Assessment Communication and Application Workshop,

INEL Oversight Program, Boise, ID; 1992

OSHA HAZWOP Training, 29 CFR 1910.120 (40 hours), 1994

RAD WORKER II Training, 10 CFR 835, 1998

Practical Models Supporting Remediation of Chlorinated Solvents, Aiken, SC; 2010

Experience and Background

2020 –
present

Director, Environmental Restoration, Idaho Cleanup Project, INL site

- Dr. Abitz leads a group of scientists, engineers, and technicians tasked with executing monitoring tasks, risk assessments, and reports for CERCLA remedial actions across the INL site. Under his leadership, the ER group has maintained their perfect safety record (no first aids or recordables), achieved cumulative cost and schedule performance indices greater than one, and received recognition from Region 10 EPA on the “high quality, well organized” Five-Year Review of CERCLA Response Actions at the INL Site (February 2021).

2016 - 2020

Deputy Director, Environmental Restoration, Idaho Cleanup Project, INL site

- Dr. Abitz led communication and planning activities to integrate ER work scope with organizations performing work across the INL site. He performed personnel reviews and management assessments to: ensure planned and executed work was in accordance with ISMS principles and established work controls; observe safety behavior of personnel performing the work; and identify project risks and opportunities. His responsibilities also included succession planning, execution of Fluor’s remediation process optimization to reduce ER project costs, and oversight of technical documents. Dr Abitz played a key role in earning the maximum fee (~\$1M) for early completion of the design for an evapotranspiration barrier at the INL subsurface disposal area.

2012 - 2016

Senior Technical Consultant, Fluor Government Group, DOE Portsmouth site

- Dr. Abitz was responsible for preparation, review, and oversight of DOE, CERCLA, and RCRA work plans and reports in the areas of groundwater quality, statistical development of background values for groundwater and soil, groundwater and soil geochemistry, human-health risk and radiation dose assessment (performance assessment for DOE Order 435.1), and hazard analysis for disposition of enriched uranium. Dr. Abitz also served as a control account manager and was responsible for

monthly cost and schedule variance reports and the assessment of project risks and opportunities.

2009 - 2012

Program Manager, Savannah River National Laboratory, Aiken, SC

- Dr. Abitz was the primary SRNL lead for the DOE EM13 program to investigate and develop technologies for the *in situ* decommissioning of highly contaminated nuclear facilities and he supported EM13 technology development for the remediation of contaminated groundwater and soil across the DOE complex. He served on a DOE EM international team as a technical member to participate in workshops on the decommissioning and dismantlement of nuclear facilities in the United Kingdom and Japan.

2006 - 2009

Principal Geochemist/Owner, Geochemical Consulting Services, Blue Ash, Ohio

Geochemical Expert for the Navajo & Sioux Nations, Coloradoans Against Resource Destruction, the Goliad County Groundwater Conservation District, South Texans Opposing Pollution, and the National Resources Defense Council, Inc.

- Dr. Abitz provided legal testimony, technical review, geochemical modeling, and geological analysis of permit applications associated with proposed *in situ* uranium leach (ISL) mines in the vicinity of Church Rock and Crownpoint, New Mexico (Navajo Nation), the Centennial Project in Weld County, Colorado, the Goliad Project near Goliad, Texas; expansion of ISL operations at the Crow Butte mine in Nebraska and the Ross Project in Crook County, Wyoming; and restoration operations at the Kingsville Dome ISL mine in Texas.

Technical Support to the Savannah River Site

- Dr. Abitz supported the contract transition team for Savannah River Nuclear Solutions (SRNS). He reviewed RCRA and CERCLA groundwater remedial systems (electrical resistivity heating with soil vapor extraction, chemical reactive barrier, and tritium phytoremediation), project controls and management systems used to status the remediation work, and regulatory milestones to assess the status of the Area Closure Projects and SRNS readiness to perform the work scope. He also supported SRNS in the preparation of the ARRA baseline estimate.

NESHAP Report for the Fernald Preserve, Cincinnati, Ohio

- For the Fernald Annual Sitewide Environmental Report, Dr. Abitz prepared the chapters on air emissions (particulate with uranium, thorium and radium isotopes, and radon), population dose, and the NESHAP annual report.

Risk Assessment for the Fernald Closure Project (FCP), Cincinnati, Ohio

- Tasked with the responsibility to develop and author the Interim Residual Risk Assessment for the Fernald site, Dr. Abitz evaluated the risk to visitors and workers exposed to residual contaminants in air, soil, and surface-water pathways. Risk

scenarios showed the incremental lifetime cancer risk to the receptors was below the recommended EPA maximum of 0.0001.

2003 – 2006

Manager of the Environmental Services Group and Senior Consultant, Fluor Fernald, Inc., Cincinnati Ohio

- As the manager for the Environmental Services Group (ESG), Dr. Abitz oversaw the work of over 50 scientists and technicians. Personnel in the ESG performed water, soil and air sampling and monitoring; analytical services for radionuclides, metals and organic compounds; data verification, validation, reduction and reporting; and *in situ* soil activity measurements for ^{226}Ra , ^{232}Th , and ^{238}U via the site's real-time instrument measurement program (RTIMP).
- As the site geochemist, he prepared an estimate of the curie inventory for the on-site disposal facility (OSDF) to provide a baseline value to DOE legacy management. The scope of this task was to develop the estimate using information from the Ohio Field Office Recycled Uranium Project Report, OU3 and OU5 RI/FS documents, the Fernald Dosimetry Reconstruction Project, remedial operation records, historic records, active monitoring data, interviews with technical personnel who supervised plant operations from the early 1960's through production shut down in 1989, and analytical results on soil placed in the OSDF.
- Dr. Abitz also served as senior consultant to the Fernald Closure Project on the long-term remediation strategy for the Great Miami aquifer. In this capacity, he coordinated laboratory and microscopy studies on the form of uranium present on aquifer sediments. The laboratory and microscopy studies examined the amount of uranium that is fixed to the sediments via chemical adsorption and overgrowth rims versus the mobile fraction that is readily desorbed from the aquifer matrix. These key studies identified and addressed the kinetics of uranium reactions to determine the time constraints associated with achieving the EPA's drinking water standard for uranium.

1998 - 2003

Environmental Science Manager/Project Manager/Senior Consultant, Fluor Fernald, Inc., Cincinnati, Ohio.

- In his role as environmental science manager, Dr. Abitz directed the Real Time Instrument Measurement Program (RTIMP), which provided *in situ* soil activity measurements for ^{226}Ra , ^{232}Th , and ^{238}U in live time. This program supported excavation and D&D work by scanning soil to confirm U contamination was below the waste acceptance criteria for Fernald's OSDF. Prior to the release of remediated land, the RTIMP performs *in situ* activity measurements to demonstrate that the soil is below the final remediation levels established for ^{226}Ra , ^{232}Th , and ^{238}U .
- As a project manager, Dr. Abitz managed a remediation budget of six million dollars

for Title I/II design work for D&D of structures and removal of all contaminated soil and subgrade structures within the former Production Area. Dr. Abitz lead a team of engineers and scientists who integrated the remedial design with regulatory issues, sampling and analysis plans, waste management operations, demolition and construction activities, health and safety issues, radiological controls, and quality assurance protocols.

- Dr. Abitz served as a senior consultant to the DOE Technology Development Program, where he performed technical oversight of several university studies dealing with the mobilization of uranium and its removal from groundwater. He was active with laboratory investigations that examine the distribution of uranium phases in soil and aquifer sediment, the leaching behavior of the uranium phases, the treatment of contaminated soil with phosphate, and the geochemical properties of aggregate materials used to construct liners in the OSDF. The research established important baseline information on the distribution of uranium in the aquifer and in OSDF construction materials, while treatment studies evaluated the effectiveness of phosphate in reducing the solubility and mobility of uranium in the disposal cell.
- As a participant in research that evaluated the natural attenuation of uranium using a combination of passive inorganic and organic systems, Dr. Abitz was involved with work groups from industry, academia, and DOE laboratories. The inorganic systems that were investigated include rip-rap channels constructed with rock containing iron oxyhydroxide phases (e.g., goethite and hematite) or phosphate minerals (e.g., apatite) and flow-through cells using zero-valent iron. Organic systems that showed potential promise include sulfate-reducing bacteria, microbial mats, lichen, and phytoextraction. A combination of these systems may prove to be practical and cost effective in the treatment of low leachate volumes generated by the OSDF.

1997 - 1998

President/Owner, Geochemical Consulting Services, Albuquerque, New Mexico.

Dr. Abitz served as a geochemical consultant to the Fernald Environmental Management Program (FEMP) and the WIPP Project.

- Dr. Abitz performed confidential work for the Navajo Nation on the proposed *in situ* uranium leach mines in the vicinity of Church Rock and Crownpoint, New Mexico.
- At FEMP, he evaluated the efficiency of selected alternatives for soil and groundwater remediation, including soil washing and *in situ* uranium leaching methods. This effort involved supervising the technical team, assisting in the negotiation of clean-up levels with DOE and EPA, developing soil-treatment protocols, and interacting with public-interest groups.
- At the WIPP site, Dr. Abitz supported the operating contractor in the area of brine geochemistry. He was responsible for oversight of laboratory analyses and QA/QC,

1994 - 1997 data analysis, and geochemical interpretation of the composition and origin of fluids in the vicinity of underground operations. Dr. Abitz also evaluated the solubility of transuranic elements in sodium-chloride brine and in brine containing organic-complexing agents such as citric acid, oxalic acid, and EDTA.

Project Manager/Senior Staff Consultant, IT Corporation, Albuquerque, New Mexico.

Dr. Abitz served as project scientist/manager on geochemical tasks associated with the WIPP Project, Norton AFB Groundwater Study, FEMP Operable Units 5 and 3 RI/FS, and Navajo EPA. Specific activities include:

- Conducted a rerun of the chemical compatibility analysis of contact-handled and remote-handled TRU waste forms and container materials, as reported in the 1995 WIPP Transuranic Waste Baseline Inventory Report (WTWBIR), for Appendix C1 of the WIPP RCRA Part B permit. Chemicals reported by the generator sites were classified into reaction groups as defined by the U.S. Environmental Protection Agency (EPA) document "A Method for Determining the Compatibility of Hazardous Wastes."
- Assisted in evaluating the geochemical performance of backfill configurations proposed in the WIPP Compliance Certification Application. Modeled the interaction of Salado Formation brine with MgO placed in the backfill to estimate the quantity of MgO required to buffer the pH of the indigenous brine between 8 and 9, which minimizes the solubility of uranium and TRU nuclides relative to lower pH values found in Salado Formation brine.
- Project scientist responsible for developing the background radionuclide groundwater report for Norton AFB, which provided a robust scientific model to explain the presence of elevated levels of naturally-occurring uranium. The task required coordination of scientific and support staff to produce a principal milestone document that was delivered to the client one week ahead of schedule.
- Project manager and scientist on the FEMP OU5 FS task to evaluate aqueous reactions of metal and radionuclide complexes in proposed injection zones of the Great Miami Aquifer. Responsible for oversight of technical tasks and final technical report.
- Project scientist tasked with supporting the Navajo EPA on the evaluation of groundwater contamination from the mill tailings at the UNC Church Rock, New Mexico site. Radionuclide, sulfate, and nitrate concentrations were evaluated to discriminate between contamination originating from the mill tailings and natural salts present in the valley alluvium.
- Project manager and scientist on the FEMP OU3 RI/FS task to evaluate the release of radionuclides and metals from the proposed on-site disposal facility. Responsible for oversight of technical tasks, budget, schedule, and final technical report.

1988 - 1994 *Senior Geochemist, IT Corporation, Albuquerque, New Mexico*

Dr. Abitz evaluated the radiochemistry of transuranic elements in sodium-chloride brine for the WIPP Project and served as the project geochemist for four operable units on the FEMP RI/FS. He was also active setting up the LANL RMMA concept and provided radiochemistry support to INEL in developing a No Migration Variance Petition (NMVP) for the INEL calcine facility.

- Developed database for the WIPP EATF to evaluate the solubility of thorium, uranium, neptunium, plutonium, and americium in sodium-chloride brine and in the presence of organic complexing agents, such as EDTA and citric acid.
- Authored white paper for OU 5 RI/FS at FEMP that discusses leaching, dissolution, and desorption processes for uranium and progeny, adsorption and aqueous complexation of the uranium and progeny with subsurface soils and groundwater, and secondary uranium phases that may form in the soils.
- Conducted site-surveys and interviewed LANL personnel on radiation practices associated with the handling, packaging, labeling, storage, transport, and disposal of transuranic materials. Information was used to support a process for the operation of LANL RMMAs and to develop accountability for all radioactive materials that enter and exit the area.
- Developed waste analysis plans for transuranic and low-level mixed wastes present at LANL. This activity was conducted to complete RCRA Part B permits and ensure compliance to DOE orders for all LANL mixed waste facilities.
- Managed and had technical oversight on geochemical program associated with FEMP RI/FS. Program tasks include the characterization of soil mineralogy by polarized light microscopy and x-ray diffraction studies, design and implementation of laboratory tests to characterize the composition of leachate derived from cemented and vitrified waste samples, evaluation of contaminant adsorption ratios, data validation, and tracking of labor and material costs.
- Designed laboratory experiments for FEMP RI/FS to measure adsorption ratios of radionuclides and metals and implemented ANSI/ANS-16.1 leach tests to evaluate the performance of cemented waste forms. Results were used to evaluate the most effective alternative for immobilizing radionuclides and metals from a near surface disposal cell.
- Led waste characterization program on INEL calcined solid waste. Responsible for evaluating radiochemistry data on uranium fission products and transuranic elements in aqueous and calcined waste forms. Assisted in the development of EPA approved sampling and analytical plans to support a draft no migration variance petition for

the radioactive calcined waste stored at the ICPP.

Professional Affiliations

Geological Society of America
New Mexico Geological Society

Presentations & Publications

Abitz, R., Farfan, E., and Coleman, R., 2011, Gamma-Ray Mapping and Waste Segregation, *presentation at the Japan Ministry of Economy, Trade and Industry/USDOE workshop on Remediation at the Fukushima Daiichi Nuclear Plant Site*, Tokyo, Japan, October 26 and 27.

Abitz, R.J., 2011, Pre- and Post-Mining Water Quality at ISL Sites: Emphasis on Kingsville Dome, *presentation to representatives from EPA Region VI, Kleberg County, Texas and South Texans Opposing Pollution*, Victoria, Texas, August 5.

Abitz, R.J., 2010, Decommissioning Highly Contaminated Nuclear Facilities at the Department of Energy Sites, *presentation at the United Kingdom Decommissioning and Waste Management Conference*, Penrith, Cumbria, UK, November 2, 3 and 4.

Abitz, R. J. and B. Darling, 2010, Anthropogenic Induced Redox Disequilibrium in Uranium Ore Zones, *Geological Society of America Abstracts w/Programs*, Vol. 42.

Abitz, R.J., 2010, Technical Basis for Approval of Decon Gel as an Acceptable Component of WIPP Waste Streams, *Proceedings of the American Nuclear Society Meeting on Decommissioning, Decontamination and Reutilization*, Idaho Falls, ID.

Abitz, R.J., A.J. Duncan, M.C. Kane, R.A. Dewberry and J.K. Santos, 2010, Planning for the Decontamination of the Plutonium Fuel Form (PuFF) Facility, Savannah River Site, South Carolina, Paper 10095, Waste Management Symposia, Phoenix, AZ.

Abitz, R.J., M. Denham, and C. Eddy-Dilek, 2009, Technical Evaluation of Soil Remediation Alternatives at the Building 812 Operable Unit, Lawrence Livermore National Laboratory, Site 300, SRNL-STI-2009-00514, Savannah River National Laboratory, Aiken, SC.

Abitz, R.J., 2008, The Need for Valid Statistical Protocols to Establish Baseline Groundwater Quality at Uranium ISL Mines, *Geological Society of America Abstracts*

w/*Programs*, Vol. 40.

Abitz, R., R. Danahy, R. Janke, B. McDaniel, and D. Seiller, 2004, "In Situ Gamma Spectrometry Applications at the United States Department of Energy's Fernald Site, Ohio, USA" *Proceedings of the 32nd International Geological Congress*, Florence, Italy.

Abitz, R., 1996, "Novel Use of Geochemical Models in Evaluating Treatment Trains for Radioactive Waste Streams" *Second International Symposium on Extraction and Processing for the Treatment and Minimization of Wastes*, The Minerals, Metals, and Materials Society, pp 167-176, Phoenix, Arizona.

Buck, E.C., N.L. Dietz, and R.J. Abitz, 1995, "The Nature of Uranium Phases at Fernald" *American Chemical Society Book of Abstracts for Emerging Technologies in Hazardous Waste Management VII*, Vol. I.

Deal, D. E., R. J. Abitz, D. S. Belski, J. B. Case, M. E. Crawley, C. A. Givens, P. James-Lipponer, D. J. Milligan, J. Myers, D. W. Powers, and M. A. Valdivia, 1995, "Brine Sampling and Evaluation Program, 1992-1993 Report and Summary of BSEP Data Since 1982," *DOE-WIPP 94-011*, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R.J., 1994, "Uranium Specie Optimization in Carbonate Groundwater Prior to Anion Exchange Recovery," *American Chemical Society Book of Abstracts for Emerging Technologies in Hazardous Waste Management VI*, Vol. II, p. 1124.,

Beard, J.S., R.J. Abitz, and G.E. Lofgren, 1993, "Experimental Melting of Crustal Xenoliths from Kilbourne Hole, New Mexico and Implications for Magma Contamination and Genesis," *Contributions to Mineralogy and Petrology*, Vol. 115, pp. 88-102.

Abitz, R. J., and M. Furhmann, 1993, "Adsorption of Radionuclides and Metals Below a Mixed-Waste Disposal Cell: Implications for Risk-Assessment Calculations," *Geological Society of America Abstracts w/Programs*, Vol. 25, No. 6, p. A-185.

Abitz, R. J. and M. Fuhrmann, 1993, "A Case Study Comparing Site-Specific Distribution Coefficients to Selected Literature Distribution Coefficients," *IT Technology Exchange Symposium Proceedings*, Vol.III, Paper 14-3, Scottsdale, Arizona.

Deal, D. E., R. J. Abitz, J. Myers, D. S. Belski, M. L. Martin, D. J. Milligan, R. W. Sobocinski, and P. James-Lipponer, 1993, "Brine Sampling and Evaluation Program, 1991 Report," *DOE-WIPP 93-026*, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R. J., 1992, "Decision Support System for Obtaining Distribution Coefficients Used in Fate and Transport Models," *IT Technology Exchange Symposium Proceedings*, Vol.III,

Paper 12-2, Scottsdale, Arizona.

Abitz, R. J., 1991, "Evaluating Inorganic Contaminant Release and Attenuation with the EQ3/6 Geochemical Code," *Geological Society of America Abstracts w/Programs*, Vol. 23, No. 4, p. A1.

Abitz, R. J., R. W. Sobocinski, and J. Myers, 1991, "Assessing Inorganic Contaminant Release to Groundwater with the EQ3/6 Geochemical Code," *IT Technology Exchange Symposium Proceedings*, Vol. II, Paper 11-2, Phoenix, Arizona.

Deal, D. E., R. J. Abitz, J. Myers, J. B. Case, D. S. Belski, M. L. Martin, and W. M. Roggenthen, 1991 "Brine Sampling and Evaluation Program, 1990 Report," *DOE-WIPP 91-036*, U.S. Department of Energy, WIPP Project Office, Carlsbad, New Mexico.

Abitz, R. J., J. Myers, P. E. Drez, and D. E. Deal, 1990, "Geochemistry of Salado Formation Brines Recovered from the Waste Isolation Pilot Plant (WIPP) Repository," *Waste Management '90*, Vol. 2, pp. 881-891, Tucson, Arizona.

Abitz, R. J., J. Myers, P. E. Drez, and D. E. Deal, 1989, "Geochemistry of Salado Formation Brines Recovered from the Waste Isolation Pilot Plant (WIPP) Repository Horizon," *Geological Society of America Abstracts w/Programs*, Vol. 21, p. A317.

Abitz, R. J., and G. A. Smith, 1989, "Stratigraphy and Depositional Features of the Peralta Tuff, Jemez Mountains, New Mexico," *New Mexico Bureau of Mines and Mineral Resources*, Bulletin 131, p. 1.

Elston, W. E., and R. J. Abitz, 1989, "Regional Setting and Temporal Evolution of the Mogollon-Datil Volcanic Field, Southwestern New Mexico," *New Mexico Bureau of Mines and Mineral Resources*, Bulletin 131, p. 82.

Abitz, R. J., and W. E. Elston, 1988, "Rising Melt Zones: Origin of the Volcanic-Arc to Within-Plate Magmatic Transition in Ignimbrites During Extensional Stages of Orogenies," *Geological Society of America Abstracts w/Programs*, Vol. 20, p. A74.

Abitz, R. J., and G. A. Smith, 1988, "Stratigraphy and Depositional Features of Small-Volume Pyroclastic Flows: Peralta Tuff, Jemez Mountains, New Mexico," *EOS, Transactions, American Geophysical Union*, Vol. 69, p. 154.

Abitz, R. J., and D. G. Brookins, 1987, "Evolution of Oligocene Volcanism Adjacent to the Southern Rio Grande Rift," *Transactions, American Geophysical Union*, Vol. 68, p. 1532.

Abitz, R. J., and R. K. Matheney, 1987, "Sr and O Disequilibrium in A Welded High-Silica Rhyolite Tuff," *Geological Society of America Abstracts w/Programs*, Vol. 19, p. 566.

Abitz, R. J., D. B. Ward, and D. G. Brookins, 1987, "Rb-Sr Age for Lower Crust in the Southern Rio Grande Rift, New Mexico," *Isochron/West*, No. 49, pp. 8-12.

Elston, W. E., and R. J. Abitz, 1987, "Characterization of Non-Basaltic Post-40 Ma Magmatic-Tectonic Provinces of Southwestern North America by Potassium Contents," *Geological Society of America Abstracts w/Programs*, Vol. 19, p. 655.

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Abitz, R. J., 1985, "Stratigraphy and Structure Along the Northern Margin of the Emory Cauldron, Northern Black Range, Sierra County, New Mexico," *Geological Society of America Abstracts w/Programs*, Vol. 17, p. 205.

WRITTEN TESTIMONY OF JONATHAN PERRY

1. Yá'át'ééh shí éí Jonathan Perry yínishyé'. Tł'óó'di Tsin déé nááshá (I'm from Becenti, NM)
Tódich'ii'nii nishł́. (Mother's clan: Bitter water clan)
Tó ahéedlíinii 'éí bá shíshchíín. (Father's clan: Water Flows Together clan)
Tsé náhabíłnii éí dashicheii. (Maternal grandfather: Sleep Rock People clan)
Bit'ahnii éí dashínálí. (Paternal grandfather: Folded Arms People clan)
2. My name is Jonathan Perry.
3. I currently reside in Becenti, Navajo Nation, New Mexico, north of Crownpoint, adjacent to Chaco Canyon.
4. I am also currently the Chapter President of the Becenti Chapter.
5. I have lived in Becenti all my life.
6. I am an enrolled member of the Navajo Nation.

Question: Can you describe your role as the president of the Becenti Chapter, your role as a former delegate to the Navajo Nation Council, and your current role as the Executive Director of ENDAUM?

7. **Answer:** I got involved with my community in 2008. After completing college I started participating in community discussions on different issues that led to my interest in wanting to help my community in one way or the other, depending on what skills were needed. That led to my first local appointment, being a land use planner within my community, which I served for a number of years.
8. During that time I worked on land issues because Becenti and Crownpoint are located within the Eastern Navajo Agency in the "checkerboard" area. It's called the "checkerboard" area because of the different land statuses. So I had to gain knowledge in the different jurisdictions that we have that we have in the area. That started my interest in land issues here within the community.
9. After a number of years in that position, ENDAUM provided a presentation at my chapter regarding uranium issues that were currently going on. By that time it was 2010. I asked ENDAUM how I could become involved in their work, and I became the ENDAUM Board President. I became Executive Director of ENDAUM in 2019.
10. That meeting was the first time I was made aware, aside from high school, that the uranium issue was still present within the area. The Eastern Navajo Diné Against Uranium Mining organization was doing the presentation at the chapter houses.
11. I made a request for additional information because we do have one primary site within the Becenti Chapter community of a past uranium mining area. That's what caught my interest

in wanting to represent my community and further discussions on issues pertaining to uranium contamination.

12. Aside from that, I continued as a land use planner within my chapter. I eventually, ran for chapter Vice President. I won that election, and during that time, I got further knowledge on more natural resource issues pertaining to the communities here with the Eastern Navajo Agency.

13. After being chapter vice president I was elected to the Navajo Nation Council, and was initially appointed to the Law and Order Committee. I served on that committee for about a year and then was reassigned to the Resources and Development Committee of the Navajo Nation Council.

14. In addition to that committee, I was also appointed by the speaker to serve on the Navajo Nation Sacred Sites Subcommittee, dealing with cultural issues pertaining to any legislation that was being introduced at the Navajo Nation council level. To be assigned to that subcommittee, the criteria were that the members have to have some knowledge of Navajo culture and were able to provide advice and recommendations on any legislation that would eventually be brought forth for consideration. Each agency on the Navajo Nation was allowed one representative, so I represented Eastern Navajo.

15. I completed my term as Council delegate and continued local community work. In addition to being on that subcommittee I was also appointed to the Eastern Navajo Land Commission, where I represented several communities as well. This Commission also has to deal with jurisdictional issues such as energy development, as it pertains to the communities and the impacts the local residents may experience. Land Commissioners also advocate for the Navajo Nation on any lands that are near Navajo communities.

16. I completed my term as Council delegate and then I was elected as Becenti Chapter president, which I'm currently serving at this time. That's the background I have.

17. During the years that I've been in leadership, I'm often asked to give advice on cultural issues, discussions pertaining to Navajo tradition.

18. In between my terms, on the side, there are various communities and other grassroots organizations that have asked for input regarding impacts on Navajo Nation culture related to different developments that have taken place in different regions. I've been able to provide those types of assistance to different communities on Navajo Nation.

Q: Where is Becenti in relation to Crownpoint and Churchrock and can you speak to the abandoned uranium site in Becenti?

19. **A:** The Becenti community is located approximately 10 miles north of Crownpoint. It's one of the first original communities within Eastern Navajo. I grew up here. We're located along New Mexico State Highway 371. We also have Navajo Route 9, that goes from west to

east within the area, our boundaries, we are community is primarily in McKinley County in northwestern New Mexico.

20. Becenti's western boundary meets the Navajo reservation, and the southern boundary borders with Crownpoint. Our eastern boundary extends into Whitehorse Lake along the road that goes up to Chaco Canyon. Our northern boundary is in line with McKinley County's boundary. We have quite a large area for our community. Although, we are one of the first established communities, we are one of the smaller chapter populations on Navajo Nation. We have approximately 1100 residents that live within our area. Of those, approximately 700 are registered voters.

21. Because we're next to Highway 371, we see a lot of traffic coming through. There are a lot of 18 wheelers that go through the area transporting things along with tourism traffic. So, primarily that's what we're seeing within the community.

22. In addition to that, we do have several land statuses. We have state land, private land, tribal ranches, tribal trust and tribal fee. We have Indian allotment lands, National Park Service land, and several U.S. executive order lands pertaining to education and administrative purposes that were originally identified.

23. There's an area located on the southeastern section of the community, an area known as Nose Rock. That area is identified within the U.S. EPA abandoned uranium mines region for the Eastern Agency. That area continues to be an issue regarding contamination. There have been concerns because there is a wash that goes through there, that we've seen, community members have issues and concerns regarding when it rains with the possible contaminants that come from that area that goes into Lake Valley and other locations. That's the primary site that Becenti Chapter has within its community.

Q: Has the United States government, the EPA, the NRC, the Department of Energy done anything to clean up the Nose Rock site?

24. **A:** Well, federal agencies, notably U.S. EPA have a great amount of knowledge on that site. They have provided a written report from 2006. But aside from that report there has been no actions or any type of initiative to resolve the, the cleanup of that location.

Q: Where do most of the people in Becenti Chapter get their water?

25. **A:** Here in Becenti we do have 13 windmills located within various sites within the community that pump water. In addition to that, we have 75 Navajo Housing Authority housing units with seniors, veterans, and children. We have a local well, so these different residents within the community primarily get their water from the Westwater aquifer that is shared with Crownpoint and Little Water. The 13 windmills also draw their water from the Westwater aquifer.

Q: Can you describe the relationship between the Diné people and the land and the water and the air.

26. **A:** Yes. The Navajo culture, primarily going back to the foundation is rooted in K'é, which means your relationship. A lot of people will note that K'é may be in reference to clans and family.

27. But going deeper into that, it's the knowledge of an individual and their relationship to both the world and the universe. It identifies who you are and your relation to where you are, whether that's in different communities, whether that's to the land, to the air, to animals, to vegetation. It's identifying who you are and your relationship to all that's around you.

28. We primarily try to keep in balance, good balance. What we call hózhó. We note that individuals have a responsibility, not only to themselves and their family or their community but also to the natural world in which you keep balance and you keep respect.

29. We try to instill these values in ways that future generations can interpret. One way that we have this teaching is through Diné Fundamental Law. We encourage our people to learn the four aspects of Diné Fundamental Law which are common law, traditional law, customary law and natural law.

30. These four areas of law take root and are connected to our ceremonies, our songs, our prayers, and our stories. They're rooted into our clans, and that helps to guide ourselves as individuals.

31. Now, when a child is born, we primarily wait for the first laugh. Once the child has their first laugh, we have a celebration and ceremony done for the individual. In addition to that, we take the umbilical cord and we bury that at the mother's home area where the family of the mother lives. That's to connect the child, for their entire life to that region, to that land, in the understanding of natural law under Diné Fundamental Law.

32. We have the connection to the four sacred elements that make up life according to Diné culture. We have air, we have water, we have land, and we have corn pollen. These four elements are needed for the Diné to live in harmony and make a good life.

33. The aspects of these teachings are also taken into the four directions that we acknowledge: east, south, west and north.

34. The idea that individuals can also identify within their location in the regions take root in stories that are rooted back to our history, notably stories pertaining to the different monsters within the Navajo history and this could not only mean physical monsters but hunger, poverty, sickness. Those are also identified within these stories, knowing that there are elements within the Navajo land that have been identified for thousands of years, and knowing that these elements have their place, meaning that there are certain things that exist within the land, underground, on the ground and in different locations that have a purpose, but it's not there to

be disturbed, in a way that can cause any type of disharmony. Any disharmony that comes from disturbance is not meant for the Navajo people, meaning that there are certain actions and certain things that happen that can lead to sickness, to poverty, to death that need to be corrected. Within Diné culture we're taught that any type of negative energy that comes can be corrected and cleaned.

35. And so, as individuals, we tried to instill in our children that rather than begin down a path where we can cause destruction and pain, it's best that we stop ahead of that and correct our behavior and our thoughts. Because of this, you have teachings within the culture that talk about the different health aspects whether that might be, mental health, physical health, social health and psychological health.

36. These different aspects also take root in the family environment now—what is the male aspect of family, and what is the female aspect of family. These different disruptions that occur because of what might happen to the male side or the female side can have lasting effects on the family environment. Because Navajo the Navajo Nation traditionally was not a single unified tribe, we had family bands that were located within different areas. It became very important to keep the male and female aspects within the family stabilized.

37. Now, the identity of an individual is a whole other discussion because not only do you have male and female, but you have feminine male and masculine female as well.

38. And so, this all ties in together, but going back to the discussion on the impacts now. The different regions of Navajo, there's different ceremonies tied to different locations. There are different ceremonies that are tied to various plants to animals. There are the families and their clans. If you look at the Navajo Nation you see different regions with clans and primary locations. Those clans also have stories.

39. The four original clans that are identified within the Navajo creation have roots within different areas of the Navajo Nation, whether that's Bitterwater, Towering House, Mud People, and The One Who Walks Around. These clans and others that were adopted and those that were expanded upon have different locations.

40. This also ties in with our teachings of stories. As we talk about the seasons that occur on Navajo such as spring, summer, autumn, and winter. And these are divided into two sections, and you have different teachings for the summer and you have different teachings for the winter.

41. And so, based on our healers, who we call Hataááíi, they have locations where they collect herbs, they have locations where they collect different minerals and different stones for their medicine bundle that they carry with them for life. Many are carried from one generation to the next.

42. This requires constant revitalizing by another ceremony specifically for medicine people where they constantly have to go and collect certain herbs and certain stones from certain

locations. And once the medicine person is identified and location, it's up to their children and grandchildren to continue to keep that medicine bundle alive and keep it in harmony with the world around it.

43. We've seen that, because of the contamination of different locations across Navajo that certain areas have been restricted from access, because of radiation and because of other types of hazards. We've seen also the destruction of certain medicinal plants and herbs that were once abundant in certain locations where they no longer grow. Because of this, this disrupts the process of keeping our healers in line with what they have to do to keep their songs and their powers up to strength.

44. These places are not only within what we now call the Navajo reservation, which we call Diné bikeyah, but also extends to areas where the Navajo people had connections with prior to the United States government or the United States being a country. These are areas in where we presently call Colorado, areas near Central New Mexico, southern New Mexico, areas in south central Arizona, areas going as far west as the Grand Canyon, others within Utah. These areas are called Dinétah. Because of the jurisdictional issues and the implementation of federal law, there are a lot of restrictions now, and so we are not able to access certain locations that we once were able to get to.

45. In addition to that, we see the different prayer sites that are located on Navajo that have been also affected, meaning that there are certain locations that were identified for local families to have areas to place offerings. Some of these areas are located in now contaminated locations.

46. You also have the songs that were identified that tie in with the different locations, because you have ceremonies that are identified with summer and winter. Now, when we have our summer and winter ceremonies, whether that is the Enemy Way or the Night Way, these are held at designated sites; we cannot just go and identify any location for the ceremonies. There are reasons why certain locations are picked and why these locations are important to maintain and keep.

47. Now, because of the intrusion that the Navajo people have had in the past, it affected a lot of these locations. We were not able to have the ceremonies in these locations for many, many years.

48. In terms of our survival, some locations have impacted water sources for the Navajo families, whether that be lakes, whether that be aquifers, or whether that be rivers that could also be areas where we had windmills. Some of these windmills had to be dismantled.

49. We also have the farming aspect, the different farms that we had on Navajo. We cannot grow in certain locations because of the impacts from the extraction industry.

50. We also have the livestock aspect, our cattle, our horses, and our sheep. We've had impacts on our animals. Traditionally, our economy was based on livestock. Because of the

situations that we've encountered over the years from contaminated sites, many families had to stop livestock production, stop relying on livestock and stop farming. This this has disrupted their family economy.

51. In addition to that, over the years, we've seen a lot of our households that were not complete, because they had lost the male aspect, meaning the men had to go off to work. Many went to work for uranium mining companies and fell ill, and had different ailments that came upon them. Some of the families were also exposed. This led to poverty. This led to other domestic issues within the homes, which we still are feeling today.

52. There is a lot of traditional knowledge, perspectives, and philosophies that have been lost over the years because our traditional teachers, our healers, our singers, our storytellers are not here to continue to share with future generations. This is valuable knowledge that is lost, and how do we continue to share this and have it present within our people?

53. Once it's gone and it's not shared, it's gone forever. And we hurt our future generations, our children, our grandchildren, because they will no longer have that knowledge, they will no longer have that connection. In Navajo, traditionally because we had always adopted others into our tribe, we had always told our children that you identify yourself with your clan, you find out who your relatives are.

54. You also have stories rooted in each clan. Your first clan, your second clan, your third and fourth. This identifies you. This tells you what is allowed, what type of natural laws exist what type of customary law exists, what traditional laws exist, what common laws exist. This helps you as an individual to know your place in the area you call home. It identifies you. It provides the opportunity for you to connect with others around you. The animals that are identified within each clan also helps you to interpret what type of stories that are related to you in the natural world. So these things are usually rooted in our children.

55. As Navajos, we try to have our children know who they are and know that they always belong. They have a place for them, they have value, and they have people that are there for them. They have relatives that are always around.

56. When these stories and these cultural teachings are lost because of no traditional teachers, and others who hold traditional knowledge, from health issues because of other impacts, the children can no longer identify themselves.

57. Who are they? How can we say that you know you're Navajo if you don't know who you are? Then that hurts us more because you know this is in terms of how we view our people, the Bureau of Indian Affairs has the Certificate of Indian blood.¹ That tells you your degree of

¹ Certificates of Degree of Indian Blood are official documents issued by the United States Government to identify the specific degree of Native American blood in an individual from a federally recognized Indian Tribe.

Indian blood that exists in you based on federal standards. That is a whole other perspective that's not Navajo.

58. But in Navajo, as long as you know who you are, you know your mother, you know your father, and you know your clans. Your umbilical cord connects you to that location in which you live; you're always going to be Navajo. You're always going to be welcomed and you're always going to have a purpose.

59. These are different teachings that are shared with younger people. Now, those that wish to carry on as a healer, as a medicine person, have a tremendous responsibility in learning the different songs, and different ceremonies that exist. It's impossible for one individual to learn all the ceremonies of the Navajo. So, you become knowledgeable in one or two, maybe three or four. But it's harder to carry on our traditional ceremonies and our knowledge of herbs, or medicinal processes that we always had knowledge of when the people who are to be teaching are no longer here. Again, we lose a lot of knowledge and basis within our culture.

60. Right now, today, we still have a large number of people who rely on our traditional medicine people. We still have a large number of people who participate in ceremonies. It's not a forgotten practice; we still live and breathe it today.

61. The fact that we continue to be attacked or we continue to be plagued by these forces that only negatively impact us is a fight, that's been going on for generations. A lot of our people are tired. A lot of our community members are hurt because they had to continue to be put under this standard that feels like we are less than human.

62. We are told to adopt to other cultures that are not for us, but yet, in order to survive as a people we had to adopt to them. It really complicates ourselves as indigenous people, because how do we measure up to a society that was never meant for us to begin with? What do we have to do as indigenous people to have our natural rights as people to be recognized? What about our ability to live a good and happy life? What about our right to know that we shouldn't have to worry—we don't want to worry about our children, and what they'll be exposed to?

63. But yet, because of federal policies and different policies that exist that only look at extraction and only look at profits, our natural rights have been ignored. The United States only looks at a perspective of having this concept of national security. What about the security of our Navajo people?

64. What about the protection of the communities that exist on Navajo? There are 110 identified communities, with over 553 clustered sites of contaminated locations across Navajo, whether that is in Eastern Navajo, Central Navajo, Western Navajo, and Northern Navajo agencies.

65. The Navajo Nation itself, we have a process in which we identify our laws and our stories. Just because it's not written, it's looked at as inferior. But in reality, if we can carry

these laws, through multiple generations, through stories and through songs, without any changes since they were initiated, what does that tell us? It tells us that we have strong laws, we have strong culture. We were able to carry on these laws with each generation.

66. If we look at how laws are made today, you have laws that are always amended laws that are always changing. But in Diné fundamental law for so many hundreds of years, it was never changed. It was always constant. I look at it and I ask, how is that inferior, if we had many, many years, and many generations that develop this law that we continue to abide by? And those same laws are sufficient going forward. What is inferior about it? I think that the concept that because it's not written, it's not as important or it's not as valuable as written laws. It's very wrong.

67. The Navajo people have every right to practice their culture and have every right to protect their culture and preserve it for future generations. It's who we are. We as Navajo people are our culture and we are our language. We are our history, we are our songs and prayers. We are not a paper, stating Certificate of Indian Blood.

Q: Are there any Diné cultural beliefs specific to uranium?

68. **A:** Yes, uranium does have its place, and even within Diné culture there is some reference to not only uranium but a few other elements that exist within the Navajo land area. There are certain ceremonies where not only uranium but other hard metals are referenced in terms of their existence within the land and the fact that even within Navajo, you have a good side and a bad side of things. Because of uranium in association with the color of yellow, it can always be a counterbalance to what we interpret with corn pollen. That's one of the bases of why, and several of our references to it, we always say that we shouldn't be bothering uranium because on one side you have corn pollen that is used as a basis of life, but then on the other side, you have uranium which is a threat to life. And so there are references, and there are certain ceremonies, a category of ceremonies that exists that relate to war, or they relate to what they call "hóch'xóonji" which is like a bad or negative side of things, and those group of ceremonies, have songs and references to not only uranium but a few other hard metals that can be dangerous to people, because they're used in a way that can cause damage or hurt to others.

Q: If ISL mining is allowed to begin in Crownpoint, what would that mean for your and your community's cultural identity?

69. **A:** Ultimately, just from what I see and from discussions I've had with people within my community, we interpret allowing mining to begin as ultimately deciding that we're disposable, meaning that if the picture of uranium mining is so important, and more important than the lives of the people here that we don't matter.

70. We say this because being a community in the southwest, we know the importance of water; the need for water for our communities and for our people. We've seen how

devastating droughts are. For years and years we've been faced with severe drought, on and off, we've had issues with our water sources drying up. This aquifer that's in discussion or that's in question is an aquifer that serves as a life source for many communities. Regardless of the geological formation, you have different areas where communities have tapped in, and to know that contamination could come from these projects makes us feel as though our lives are not important. It makes us feel as if our culture is still looked at as inferior.

71. This type of action on these type of communities is still in error is still rooted in areas of attack on our people. Our ancestors had encountered a lot from the federal government, the federal Indian policies. It's really hard sometimes because these stories, you often look at them as textbooks like, "oh, people learn about them." It's like history that's long gone, but for me, I can connect me to my great grandmother's generation and the stories within my family we still share them - my grandmother's mother was around at that time. And she taught my grandmother a lot and she shared that with me, as a young person before she passed away.

72. But, you see that connection with your family and you realize how many are not here today because of those actions in the past.

73. But these types of actions regarding uranium, and the ISL projects, are still attacks on our people, because of that life force of water.

74. If we look at, as I stated earlier, the umbilical cord of a child being buried within their home areas, if these areas should become contaminated, if these water sources are no longer available for us, where do we go? Do we still have a home? Do we still identify ourselves as Náhookáh Díyin Diné which is the holy surface people, where we've been identified with where we are the holy people in Navajo teachings, gave us locations to live allowed us to live in those areas in harmony. But if those areas are no longer there for us, where do we go? Where do we call home?

75. We see that already that many of our people on Navajo Nation who have been relocated because of contamination from other types of uranium mining. You see the pain that they have to go through, the struggles they continue to have the negative impacts not only economically but, socially, emotionally, spiritually, and this this further hurts more people. We do not want that; we have already endured so much.

76. Some people will say, well, indigenous people or Navajo people are resilient. But how many generations have to keep fighting? How many generations have to keep hurting? How many generations have to try and put on that armor to fight for themselves or their relatives for the next generation?

77. They say that we are a civilized society and the United States of America is one of the top countries in the world. Well, that's not true when you come to this side of the country. Are we really disposable to where we can say that we have to sacrifice ourselves for the greater good of the other parts of the country? It's not right that our Navajo communities here have to

always have that in the back of their mind. It's not right that our children have to be taught this at a very young age and be told that you have to fight harder than other children who might be non-indigenous because of the situations that you're placed in.

78. And so this ISL mining project is a threat to our communities. It's a threat to the future of our communities. It's a threat to the future generations of these families that reside here.

79. Where do these communities and families go? They would have no place to go. Do they just decide to stay in that immediate area and live with contamination? Do they decide to stay in the area and not question if they will get sick, but instead when will they get sick?

80. These are real questions that individuals ask themselves and have to live with, day in and day out. The federal agencies that send representatives to work with these communities, they come and they go, they don't live here 24/7. They don't live here, 365 days out of the year. They get to go back to a safe location, other locations, but us as Navajo people we have to continue to live here. We're cornered in terms of these types of projects.

81. It's very, very disturbing and very disheartening to know that the federal government does not properly update laws that would protect our people. We have the, the mining law of 1872, I believe, which is outdated and dangerous. But yet, that law still exists.

82. Those are types of things that the federal government if they truly had good intentions toward our indigenous people, those types of laws would not exist. Today, they would not continue to exist, but yet they do.

83. And these mining companies. These projects are rooted in those types of laws. They allow for production, they allow for operations. Even the states with their state statutes that exist. There are a lot of things that the governments can do to address and show that they are truly there for the Diné but they don't. We want to see this stopped. We don't want ISL mining. We've seen what it has done in other locations in the country. We have some within our communities that have witnessed firsthand these irreversible practices. And we don't want it. Those people that have true knowledge of these technologies that exist know that that's not enough to say that our communities are safe. It's not enough to say our people are safe.

84. That is the major threat, the fact that the Westwater aquifer is even considered for mining is a threat to all the communities within the region that rely on its water, whether that be Navajo communities or non-Navajo communities. They are all impacted.

Q: In your role as a community leader, did the United States Government ever ask you how the proposed uranium mine would affect your community culturally?

85. **A:** Never during my entire time in the leadership position and even as an active community member prior to any elected position. I had never seen an NRC representative or anyone associated with NRC come to my community, to have any type of discussion regarding uranium contamination regarding any sites within Eastern Navajo or even on the Navajo

Nation. As an elected official, I never received a letter; I have never received an email, a call, or any type of correspondence of any of any type of media directly to me, any type of notice that I've gotten of any NRC event or meeting taking place was by second hand. I've heard that letters go to the Navajo Nation, but I during my time as a leader I have never received any type of letter.

86. During all those years, notices of hearings or anything that might come up was always done, primarily off reservation- off the Navajo Nation. So a lot of community members did not know about it until after the fact because it would be a story in the newspapers. In addition to that, any type of communication through radio was primarily always in English. Because of that, a majority of our community members were not fully informed or aware of the situation because a lot of the verbiage that was used was technical and advanced. A lot of our people within our communities still have the English language as their second language. Taking time to slow down and make clarifications is hardly ever given, most of the time, and even the radio forums that are held, oftentimes, either they're too technical, or it feels that they're read off on a script and read fast. So there's not a lot of time for comprehension coming to the public.

87. Any type of notices, whether that might be documents, we don't see that at the local level. Chapters are not provided any type of documentation regarding hearings - they're not shared locally. They might be shared at a higher level but nothing at the community level is usually given to us. So that causes disconnection.

88. It feels as if NRC does not understand the Navajo Nation government system. It feels like they think that if they contact one sub-agency that they're contacting everybody on Navajo, but it's not the case. And so there's a lot of lost communication because of that. There could be better steps taken to ensure that the public are properly informed and educated on these types of discussions, but that does not happen.

89. The education factor, the engagement of the community from federal agencies does not exist. We don't see them coming out to the communities to say, "these are what our initiatives are, this is how our plans would impact you. This is how you can be involved." That doesn't exist. Instead, we get projects where these corporations come in and they take natural resources and they contaminate these areas without any regards to the neighbors in that area, the locals, the residents, the indigenous people.

Q: Do you believe the United States is upholding its obligations to the Navajo Nation under the Treaty of 1868?

90. **A:** I don't believe they are. Going back to the Navajo Treaty of 1868, which we refer to Náaltsóos Sání or "the old paper" - if you read article one of the treaty it says that any harm or any danger that's bestowed on Navajo Indians that the responsible people that have been involved with that type of activity would be punished according to law.

91. These companies and these prospectors that came into the Navajo homelands and

started these types of projects, these uranium extraction projects that caused a lot of harm and the federal government did not properly protect the Navajo people. It did not properly protect the land, the animals here.

92. To this day, we still don't see any proper type of plan in place to help resolve those issues, years and years of issues. The fact that the NRC is granting licenses for mines such as the Crownpoint Uranium Project, they're further encouraging these types of activities.

93. With the federal government encouraging the national uranium reserve, those types of initiatives at a national level, also encouraged this and it just brings forth more damage and destruction to our people and the animals and the land here.

94. The Navajo people for years have been working towards trying to get the past contamination impacts resolved, but the federal government continues to not provide adequate solutions for us and work with us to do that. We don't believe that they're upholding their side of the Treaty of 1868.


95. The fact that these projects continue to be proposed and accepted shows us that the federal government does not take their part of the Treaty of 1868 to a level that would provide security and provide space for the Navajo people to flourish as they were promised.

96. We held up our side of the treaty by not waging wars, by adapting to certain practices, and even assisting the federal government and the country in times of war, going back to World War II and other wars along the way, allowing our young men and women to be part of their military and defending the country.

97. But even beyond that, the individuals that were employed with these uranium mines mining companies who did their part during the Cold War era, and the fact that they are not being properly compensated.

98. They still have to fight their way to get things resolved for them for exposure. These are Navajo people that have been fighting for years and years. When we signed the Treaty of 1868 we understood that the federal government would be helping us to provide health services as well. These have not even been fulfilled, the Indian Health Services and the needed areas that would concentrate specifically on the needs that the Navajo people would have resulting from uranium mines. They're not in a condition here to where they would meet the demands of the population.

I swear or affirm under penalty of perjury that the foregoing testimony is true and accurate to the best of my knowledge and belief.


Jonathan Perry

Date: 10-14-2021

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USNRC

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NAVAJO TRIBAL UTILITY AUTHORITY
AN ENTERPRISE OF THE NAVAJO NATION

RULEMAKING
ADJUDICATIONS STAFF

December 23, 1997

SERVED JAN - 5 1998

Office of the Secretary
Attn: Rulemaking and Adjudications Staff
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Docket No. 40-8968-ML

Dear Sir or Madam:

This is to advise the Nuclear Regulatory Commission that the Navajo Tribal Utility Authority Management Board has enacted Resolution NTUA-11-97 (copy enclosed), opposing the proposed in situ leach mining of uranium by Hydro Resources, Inc., at Crownpoint, New Mexico.

Sincerely yours,

Malcolm P. Dalton
General Manager

MPD/lmb
Enclosure

9801230197 971023
PDR ADDCK 04008968
C PDR



DS03

Attachment C

Home Office: P.O. BOX 170 FT. DEFANCE, AZ 86504 (520) 729-5721	KAYENTA P.O. BOX 37 KAYENTA, AZ 86033 (520) 697-3574	TUBA CITY P.O. BOX 398 TUBA CITY, AZ 86045 (520) 283-5421	SHIPROCK P.O. BOX 1206 SHIPROCK, NM 87420 (505) 368-4639	CHINLE P.O. BOX 549 CHINLE, AZ 86503 (520) 674-5470	FORT DEFANCE P.O. BOX 587 FT. DEFANCE, AZ 86504 (520) 729-5727	DILCON HC-63 BOX D WINSLOW, AZ 86047 (520) 657-3258	CROWNPOINT P.O. BOX 1825 CROWNPOINT, NM 87311 (505) 786-5566
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RESOLUTION OF THE
MANAGEMENT BOARD OF THE
NAVAJO TRIBAL UTILITY AUTHORITY

NTUA-11-97

Stating the Position of Navajo Tribal Utility Authority on
Proposed Uranium Solution Mining in Eastern
Navajo Agency by Hydro-Resources, Inc.

WHEREAS:

1. The Management Board of the Navajo Tribal Utility Authority ("NTUA") is delegated authority and responsibility for the management and operation of the Authority, 21 N.T.C. §7(a)(1); and
2. The mission of NTUA pursuant to its Plan of Operation is to provide electric, gas and water utility services to the Navajo Indian reservation where such service is economically feasible; and
3. NTUA has two operating wells in the vicinity of Crownpoint, New Mexico, which provide water to a consumer population of approximately 10,000 in Crownpoint, New Mexico, and surrounding Navajo communities; and
4. Hydro-Resources, Inc., a New Mexico subsidiary of Uranium Resources, Inc., a Texas corporation, has filed for a license with the Nuclear Regulatory Commission to mine uranium at Crownpoint and Churchrock, New Mexico, using an in situ process; and
5. Previously, NTUA has provided comment in response to an Environmental Impact Statement on the proposed solution mines and stated a concern that its wells and parts of its distribution system will have to be replaced if HRI is granted a license to proceed with mining; and
6. The Nuclear Regulatory Commission is proposing in the Final Environmental Impact Statement to require HRI to plug and abandon NTUA's Crownpoint wells and to drill and equip new wells to be located farther from the mining areas, and to replace NTUA's affected water distribution system; and

7. The Nuclear Regulatory Commission's proposal does not address future operation and maintenance expenses that NTUA may incur due to calcification of its water distribution system, nor does it address future water quality and quantity concerns in connection with the relocated water supply wells and restoration of ground-water after mining; and

8. The Management Board of NTUA deems the response of the Nuclear Regulatory Commission to be inadequate and not responsive to the needs of NTUA with respect to its water system and the community of Crownpoint to maintain its existing high quality water supply and to allow growth in its use; and

9. It is in the best interest of NTUA and its customers that the Management Board state a position on the Nuclear Regulatory Commission's requirement that HRI plug and abandon NTUA's Crownpoint wells and replace its water supply wells and parts of its distribution system affected by solution mining.

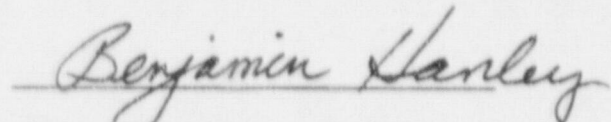
NOW THEREFORE BE IT RESOLVED THAT:

1. The Management Board of the Navajo Tribal Utility Authority states its opposition to the proposed in situ leach mining by Hydro-Resources, Inc., in Eastern Navajo Agency at Crownpoint.

2. The Management Board directs NTUA management to inform HRI and the Nuclear Regulatory Commission that it will not agree to plug and abandon its Crownpoint wells.

C E R T I F I C A T I O N

I hereby certify that the foregoing Resolution was duly considered by the Management Board of the Navajo Tribal Utility Authority at a duly called meeting at Tucson, Arizona, at which a quorum was present, and that same was passed by a vote of 7 in favor and 0 opposed, this 11th day of December, 1997.



Benjamin Hanley
Assistant Secretary, NTUA

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

HYDRO RESOURCES, INC.

Docket No.(s) 40-8968-ML

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing NTUA RESOLUTION ENACTED 12/11 have been served upon the following persons by U.S. mail, first class, except as otherwise noted and in accordance with the requirements of 10 CFR Sec. 2.712.

Office of Commission Appellate
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Dated at Rockville, Md. this
5 day of January 1998

Adria T. Byrdson
Office of the Secretary of the Commission

WRITTEN TESTIMONY OF RITA CAPITAN

1. Yá'át'ééh shí éí Rita Capitan éí yínishyé'.
I am from Crownpoint, NM - T'ees T'sosii'.
Ts'ah yisk'idnii nishł́j. (Mother's clan: Sage Brush Hill clan)
Kiyaa'aanii 'éí bá shíshchíín. (Father's clan: The Towering House clan)
Tódich'ii'nii 'éí dashínálí. (Paternal grandfather: Bitter Water clan)
Tsenabahi ł́ nii éí dashicheii. (Maternal grandfather: Sleeping Rock People clan)
2. My name is Rita Capitan.
3. I am an enrolled member of the Navajo Nation.
4. I live in Crownpoint, Navajo Nation, New Mexico.
5. I have lived in Crownpoint my entire life and raised my family here.
6. I am currently the President of the Crownpoint Chapter.

Question: How has pollution from historic uranium mining, including the Mobil ISL Pilot Project affected your life?

7. **Answer:** I've worked for schools for a long time - for years and years. I always knew that there was uranium mining happening in the Smith Lake area, about 14 miles away from Crownpoint, and in the Churchrock area, about 32 miles away from Crownpoint. The Mobil ISL Pilot Project is about three miles west of Crownpoint.
8. So most of us knew back in 1970 - we knew that there was a lot of mining going on. And then around 1976, there seemed to be a lot of explorations that went on in our area. There was also talk about more mining on the north side of Crownpoint in the Becenti area at the Nose Rock mine.
9. Working at the high school and middle school at that time, we had a lot of non-natives who came to our area, and eventually there was a trailer park that was built on an allotment, the allotment belonging to one of the Navajo allottees. It's hard to find a land in this area to build anything. But I am sure that the allottee got paid lots of money to get the trailer park built on their land.
10. I would say at least 60 trailers were allowed to move in and all were non-natives, and a lot of their kids went to school where I worked. And so, that impacted our community.
11. But during that time when all these miners came in, there were a lot of explorations that were happening. I know that because there are a lot of mesas surrounding our area, and you could see lights all over the mesas, I mean they were everywhere. You would think that it would be hard to set up these machines these tall lit up machines on the mesas, but somehow they got up there, and there were lights everywhere. There were vehicles that belong to the

mining companies just everywhere you go here, Smith Lake going down to Churchrock. That went on for years and years.

Q: How did ENDAUM start?

12. **A:** I would say about 1986, around that time, a lot of uranium activity started to slow down. And eventually, these miners they started to move off, and pretty soon everyone left. I guess uranium wasn't worth working for anymore. So a lot of it just came to a halt and a lot of our kids left because they moved their trailers out or the trailers were left there and sold to someone else and, eventually, all the miners left.

13. Just around that time, [my husband] Mitchell was unemployed and he took a job with Mobil Oil. It was near home and we were so busy in our lives that we didn't really know too much about uranium. At that time, Mitchell did a lot of silversmith work. But that was too complicated and it was so much work, he gave up silver smithing and went to work for Mobil Oil. He did that for six years. We had many conversations after that about the kind of work he did in within the lab department with the Mobil Oil ISL Pilot Project and it was in my mind for a long time.

14. One day in 1994, I think it was October or November, we picked up a Gallup Independent newspaper, our local newspaper, and on the front page right there: Crownpoint will be opening up for another round of uranium mining.

15. It was surprising because before that we never heard anything about anything happening like that. We just read it in and left it at that for maybe two or three days. In the back of my mind, I thought about the stories that Mitchell told me about working at the Pilot mine and I started to worry. I thought, oh my gosh, uranium and our water.

16. So we started talking about it in the evenings when we had dinner and we started to talk about it and the more we talked about it, the more we started to say that we can't do this. We can't allow this to happen. Nobody knows about it, nobody's talking about it.

17. Well, we found out weeks later that there were a lot of meetings that had been happening at our local parish hall here in Crownpoint. It's a parish hall to St. Paul's Catholic Church, and they're located right next to the HRI processing plant. The parish hall is often used for meetings. Anybody can have meetings there, community can have meetings there.

18. We found out that there was a lot of meetings there with allottees. Again, no one knew about it. I guess, just the allottees knew that all these meetings were happening. So, after one of our dinners...

Q: Was HRI holding those meetings?

19. **A:** Yes, we found that out later on.

20. So then we decided we have to find out what people want. We have to know how our community people will feel about this, whether it's safe or not safe.

21. We planned a meeting. That was the only way we could get word out. I would say maybe a week or two after this big announcement on the newspaper, we decided that we should have a meeting with community members. So that's what we did. To our surprise, some people showed up and a lot of people who were supposedly allottees showed up.

22. We started talking about the mine. What we found in the newspaper explained the proposed mine and of course right off the bat Mitchell started talking about his experience with Mobil Oil and the ISL pilot project. Half of those people that attended agreed that we needed to talk about this some more; that it wasn't a good idea.

23. Then we started getting some comments from the allottees. At the time, a lot of them were our friends and some are our clan relatives, and they started talking about how they thought that what we were saying was not true. Things came out like, well, we already gave our approval for mining, we are the land owners, we gave our approval. This mining will happen, is what we were told. It was a long meeting. We got a lot of positive feedback, and a lot of negative feedback on the part of the allottees.

24. What we decided to do was set another meeting. We did that, and we were lucky that an individual who is from our hometown here attended. She now serves as a district attorney in Gallup. Her name is Bernadine Martin.

25. She came to our meeting and she said according to that article in the newspaper, we have 30 days to say something, to object. We need to know, as a community, if we're going to object, we've got to write a letter to somebody in Washington, DC at the NRC.

26. At the time, we weren't really familiar with any of the legal process. Some of our elderly that were there at the meeting said to Bernadine, well, can you do it for us, because you know the law, you're an attorney. So, thank goodness we had Bernadine Martin, to do a letter to NRC.

27. It was that big orange booklet [the NRC's Draft Environmental Impact Statement] that we had to object to. So that's what Bernadine Martin did and that's how it started.

Q: Why were you so concerned about what you read about the mining project in 1994?

28. **A:** Well, I was concerned because it seemed like everything was going to go through for HRI. But in talking with my husband Mitchell about it, he started talking about that pilot project that went on two or three miles from here. He started to talk about how they were trying to do a pilot in situ leach mine, which they say is a different type of mine and it's so much safer than the regular conventional mining that was going on. Mitchell started talking about how when he was there as a lab worker in that trailer with Mobil Oil, that he never saw or heard anyone say we've got it. We've got it, it's safer. It's going to be so much better.

29. Instead, he heard a lot of negative solutions. How Mobil could never reclaim the aquifer and that it was going to be safe for the community. You never heard that. The mine supervisors and engineers would always argue amongst each other and all these experts that came from Denver, to the Mobil pilot area, who were so annoyed and frustrated that groundwater restoration wasn't working, that in the *in situ* leach mining pilot wasn't working out.

30. Either way, the water is going to be contaminated, and they're talking about our drinking water. So that made me very, very cautious and concerned about what they might do to our water because for years and years, Crownpoint is always considered to have good water.

31. A lot of people from everywhere, some clan relatives, neighbors, friends, came as far as from Thoreau and Smith Lake and said Crownpoint water was the best. It had a much better taste than anywhere else. That was the main reason why we said who are these guys going to come in and contaminate our water like they did to Pinedale and Churchrock, and then Smith Lake's well? Are they [HRI/NuFuels] just going to go around, destroying everybody's drinking water and then just move off like they've been doing?

32. We couldn't do that. So we stuck in there for years and years because we weren't about to let HRI or any company to come in and destroy our good water.

Q: Did the fact that the U.S. Government let mining companies walk away from their messes in Churchrock and Smith Lake and Mariano Lake and Pinedale factor into your concerns?

33. **A:** Yes, all kinds of factors came into mind when we started in and that's exactly true, we know a lot of people in Smith Lake - clan relatives, friends - and they never had good water after the mining left. And the same thing for Churchrock area.

34. Mitchell used to work for NTUA [Navajo Tribal Utility Authority, a tribally owned utility]. He was a meter reader for years, and whenever he went to different areas, all over, there were certain places like Pinedale and Smith Lake where people complain that their water wasn't good.

35. It just felt like the mining companies came out and did what they needed to do, which is to take uranium and get their money. When uranium prices went down they just up and left and left the big mess.

36. I thought, oh my gosh, we can't let them do that. I never knew that uranium could be radioactive for so long, thousands of years and never goes away. I could just imagine all the contamination that was done underground and everywhere else in the Churchrock area. There's so many problems with doing restoration in that area. Nothing was ever cleaned up and it's just a big mess there. We felt like we were used, we were ignored, our health and our generations to come were ignored. They're being ignored and we're not leaving any good water for them just because the mining companies were coming in. They didn't care about how our

lives would be years from now. They didn't care how our lands would be destroyed and left with all this contamination.

37. For years and years we've talked about that, we just felt like we were just ... we were ignored. Many times we went before NRC. We gave them comments about our concerns but we were just never satisfied with their answers.

Q: As Chapter President and as a mother, can you discuss how permanent contamination of the aquifer in Crownpoint affect your community and your family?

38. **A:** It would be something that can never get cleaned up. I always give an example. You know how you can have black coffee but when you start adding something like cream, it spreads through the whole cup of coffee and you can't take that cream back out of the coffee. This would be the same way for our water. We have good water. We call our water pristine.

39. For someone to come and just for money, add contaminants, to our water - you know it'll never be the same. That was what I was afraid for. It's not just for now at the present time. We have generations to come. I would want my children, my grandchildren, my great grandchildren, my great, great grandchildren on down the line, to enjoy what we enjoy today, which is clean water. It would be a shame to die and not know if our kids may go through something worse than what Churchrock and Smith Lake and Cove [Arizona], and a lot of other places where mining happened, went through.

40. It would be a shame to leave our generations with contaminated water and land as well, and air of course.

Q: When you and Mitchell started ENDAUM in 1994, did you think you would still be resisting the mine 27 years later?

41. **A:** No we didn't.

Q: Can you talk about how you thought the NRC process would unfold and what going through the process over the years has meant to your family?

42. **A:** At first, we didn't know about the NRC. We thought we managed to get behind their skirts, so to speak. But we found out later on that NRC was not really protecting our people. We knew in the back of our minds that they weren't really out to help. They were really out to help the companies rather than the people. That was always very disappointing.

43. There were days when we thought we had it made. But things would end.

44. Because of the mess that was left behind in so many places, we thought that the NRC would see it and just put a stop to the whole thing. That's what we wished for. But it never happened.

45. Instead, many times through the years we felt like our, our rights as human beings, as Natives, were ignored. Very much ignored. We just never got help from them at all.

46. I remember a judge coming out, Judge Bloch [NRC administrative law judge Peter Bloch]. He came out to see for himself and we had this big meeting with Judge Bloch. A lot of people were interested, to where a meeting was held in the south gym here in Crownpoint. A lot of people who didn't wish for this mining to take place, in opposition, a lot of us were there. Judge Bloch himself wanted to take a tour of the areas where this mining was supposed to take place.

47. They took a bus up to the mesa near Crownpoint. I don't know if he really saw that there would be a problem. But I know that he saw a lot of trash alongside the road. He started picking trash and said that was a beautiful land but why all this trash?

48. Well, as far as we were concerned, uranium is trash as well. They want to allow the mines to come and create more trash for our area. That would be the contamination that they would do to our lands.

49. I definitely think our human rights as people and as Natives were ignored. To this day, we're being ignored.

Q: Did you think the proceeding at the NRC would take 10 years?

50. **A:** No. There were many times where I thought, we have a family, we have a life to live.

51. At the time, Mitchell loved rodeo; has all his life. He served as president for his Rodeo Association. He also helped sponsor the Eastern Agency Fair every year, and it takes a lot of work to do those things.

52. We were always both involved in community organizations or events that go on here. When we started this in 1994 opposing mining, no, we didn't think it was going to take 27 years.

53. It's September 2021 and we're still at it. If we knew in 1994 we were going to be involved this long maybe we might have just said "no"; we have too much to do. But we stuck in there, we couldn't leave because I just knew that if we got out of it and just left it for others to work on, the opposition could have stopped. It could have been done away with a long time ago. But we stuck in there. We had to go before the Navajo Nation Council and the Navajo Nation President. There were different presidents. Many times, there was a change over and council delegates went before them.

54. Some supported us but the next year there were different ones in there, so over and over and over, we had to go before different councils.

55. We worked with a council delegate named George Arthur, and George Arthur knew that his brother could do a lot of the work for us to get legislation before the council. This person,

Harris Arthur put a lot of work into legislation, went to a lot of meetings and sessions. He did a lot of work for us and he was able to talk to a lot of the Navajo Council, and they finally understood exactly what uranium could do to our communities; the devastation that would happen if they allow HRI to do *in situ* leach mining.

56. So, at that time, in 2005, the legislation passed, and our Navajo Council put in a new law to have no more mining in our area, anywhere on Navajo reservation until everything is cleaned up.

Q: Does it bother you that that the NRC said that the Diné Natural Resources Protection Act doesn't matter to its decision?

57. **A:** Yes, it bothers me very much. How dare they!? They don't they don't live here. They live somewhere else and they don't care. NRC has always pushed for more uranium mining. This is what I mean by they're not trying to protect our rights. In fact, they're going against us each and every time, and it just bothers me that they said that.

Q: Can you explain why clan relationships are important and what affect the threat of mining has had on your clan relationships?

58. **A:** For the Navajos, clan relationships are very important. In fact, they stress, all the time how you should know your relatives. When we started having our ENDAUM meetings, way back in 1994 and into 1995, those were the roughest years that we went through, Mitchell and I.

59. A lot of times, our friends and our clan relatives who were always so good to us, all turned against us. In 1994, of course, we were still a young couple. A lot of our clan relatives who were once our good friends and neighbors turned against us. They didn't look at us, we were considered a threat to them. Many would tell us the mining company told them ISL mining was safe, that it's a new kind of mining. They told us we were getting in the way of them getting paid for it.

60. It was very hard for us. In fact, it was emotional for us that a company, such as HRI, could do this. It was like that for a long time, and we were threatened, as well. Our lives were threatened.

61. Eventually, through the years, many came back and they started talking to us again, all these people that turned against us. I don't know if they realized that they made a mistake by listening to HRI saying that it's safe. Maybe they came back and decided, HRI was lying to them, I don't know, but eventually they came back and we're all good friends now.

62. But we also had a lot of backing, we did have a lot of backing. A lot more than the Allottee Association. There were also some allottees that came to us, who were afraid to face their allottee relatives to say hey you know it's true uranium is dangerous. We don't want to be part of it. They didn't want to say that to the other alottees, but they came to us in secret.

63. Many times, I went to the grocery store and I got approached by allottees who told us: keep at it, you keep doing what you're doing. We don't want the uranium either, because we know that it's not good, it's not safe. It's going to destroy our water. So keep doing what you're doing. Hang in there.

64. We heard a lot of that so that's why we just hung in there. With the backing that we had, telling us the same thing. We hung in there as long as it took to oppose it. And it always made us feel better.

65. But the people that would be getting the most royalty money I guess are the ones that really went against us. They publicly threatened us during some of these meetings, but we just let it be. We learned to just ignore it.

66. We always told ourselves Mitchell and I, we can't just let it go. We've got to keep going, we have to lead; keep leading and not give up. So that's what we did.

67. We went through, but we still held our regular jobs. I don't know how I did that. We had bosses who really supported us as well. I used to work for a principal that told me this is really important; it's for a good cause, go ahead and take the day off if you need to, take care of some important business with ENDAUM. If I didn't have bosses like that, I might have just quit.

68. But the NRC never asked about our culture and how people value clanship and relatives. If you're traditional you know there's certain do's and don'ts that come with it.

Q: Knowing how much money and how much time went into the work you did, do you feel like other communities around Navajo could do the same thing?

69. **A:** I don't think so.

70. If Mitchell and I didn't see it through, I would feel bad, I would you know feel like I wasn't a good parent. This was kind of the same thing. If there's something that's very important, stick to it and get it accomplished. Don't give up in the middle of it, don't just leave.

71. We couldn't do that. A lot of times I pushed Mitchell, he was tired. Sometimes he'd come home from a rodeo and he was very tired, but we still managed to get to some ENDAUM meeting that we had to get through and I would tell him "I know we're tired but we gotta do this, we can't give up." We can't just leave people in the, in the midst of all this important step that we still have to do.

72. I didn't know it was going take more than a million dollars to pay lawyers and experts - you know, a lot of hydrologists and a lot of other experts.

73. If we didn't do this maybe the mines would have started. There would have been more damage to our water, to our land, to our air. A lot of damage would have taken place if we just gave up.

74. But we had to stick up for what was right. It was a lot of work. It caused a lot of white hair. But we did it for our families, our people, our community and probably the whole Navajo Nation.

75. If I knew was going be so much work so much money, maybe we would have just stopped. We didn't know where it was going to take us. I thought it would only take a couple of years to get this taken care of and we'll be okay. But no, it took over 20 years to get this far.

76. I think in so many areas our human rights were violated. We had to speak up. And that's what we did. Ten years ago when we reported it to the Human Rights Commission that our rights were violated, I thought that we were never going to be heard. But now we're going to be heard and I hope something really good comes out of this.

I swear or affirm under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge and belief.



Rita Capitan

Date: Oct. 18, 2021

WRITTEN TESTIMONY OF MITCHELL CAPITAN

1. Shí éí Mitchell Capitan yíníshyé'.
Tó'aheedlínii Diné'é nishłj. (Mother's clan: Flowing Water clan)
Naasht' ézhí bá shíshchíín. (Father's clan: Zuni people)
Bit'ahnii dashicheii. (Maternal grandfather: The Moth People clan)
Tsenabahi ł nii dashínáí. (Paternal grandfather: Sleeping Rock People clan)
2. My name is Mitchell Capitan.
3. I am an enrolled member of the Navajo Nation.
4. I currently reside in Crownpoint, Navajo Nation, New Mexico.
5. I have lived in Crownpoint my entire life.

Question: Can you relate your experience working at the Mobil ISL Pilot Project?

6. **Answer:** Yes, because that's what kind of made me concerned in the first place about HRI when I read about them in the paper in 1994. I was surprised that I was hired with Mobil, I used to work for the school. I decided to work somewhere else and I resigned from there. I worked for the school as a liaison, visiting parents and working with students a lot, working with the communities that kind of helped me to know a lot of people around the Crownpoint area.
7. But then I started working with Mobil and it was like a new thing for me, I had to learn more knowledge of a lot of fundamental elements. I'm talking about water, mainly, and other sources of chemicals and stuff like that. Things on the Periodic Table of Elements. You know in high school, we learned that; I was always lost on that issue. But after I started working for Mobil, I worked for this doctor, he was a chemist, and he taught me a lot, he taught me so much.
8. He taught me all the elements and how they react together. And what this kind of mining [ISL mining] it really pertains to different elements that we have, that work against each other, waste of all different categories that are in the metal, in the air, all these different elements like hydrogen, oxygen, bicarbonate, and then I learned about the iron.
9. That's when I first learned about molybdenum. And I never knew that we have a lot of molybdenum in the ground itself. It stays down there, it doesn't really react with our water when it is naturally flowing, as it is with Crownpoint water. But once it starts to be react different chemicals, you start generating all this contamination of different metals; concentration of iron, molybdenum and calcium and uranium. They react to all these chemicals that they pump into the ground into the ore body.
10. So that's what I learned, back when I started with Mobil. Before I even started with Mobil, I had a temporary job in the summertime. I started working for this company, it's a small

company but they were doing uranium drilling exploration. I started working with a backhoe tractor. What I did for this exploration company was, they used to have drilling. They used to drill all over the mesa, southwest of Crownpoint, up on the mountains and right along the mesas. There's a lot of scars from earth movement in that area. You can see it as you're going up to Mariano Lake from Crownpoint, you will see that along the mesas.

11. That was what I did. I used to drive a tractor, and we used to go way up the mountain up here and I used to dig a trench, a pit, probably like 30 feet by 15 feet. And that's where they used to drill, near that area, and they used to pump water. They used to drill way down deep into the ground about 2000 feet deep to try to find the ore body, where all the uranium is, where the water is at. I did about 30 pits with them up on the mesas.

Q: What did they use those pits for?

12. **A:** They used to pump water into these pits. They were about 10 feet deep. They used to fill it with water, and what they did with that water is they would pump it into the ground to help them drill. Then they'd start pumping that water back up, see what they find. After they're done with that they took out most of the water.

13. But the slurry used to stay there. What they told me to do was to cover those slurry pits back up, with the dry dirt I dug up and pack it back down. So that's what I did most of my summer days.

Q: Did the pits have liners in them?

14. **A:** No liners, just back to the earth. So that's what we did up there, you know, cover them up. I remember I used to build a small pit, I'd say about two by eight feet and about four feet deep. And they used to throw all their trash in there, what trash they had, anything. Just cover those things back up and you're done. Just cover it back up, go to another site. I did that most of the summer.

15. We also used to help Mobil. They would drill some areas, different areas, for sampling. We used to help them.

16. Mobil had a mine just west of Crownpoint. I would say about three and a half miles west of Crownpoint just south of Route 9. They had a pilot project plant right there. They were doing ISL mining, *in situ* leach mining, and they used to pump water into the ground. They used to have a production well and four injection wells on the sites, and the production well would be in the middle.

17. They used to pump injection wells with a high concentration of bicarbonated water to fizzle out that uranium ore body underground about 2000 feet deep. They used to pump water, 24 hours a day. The water would run through big tanks, and they used to have two columns, those columns were at least 30 feet high, and they used to have resin beads in there.

Q: Those were the ion exchange columns?

18. **A:** Yes, the ion exchange, and so they were filled with resin beads. They used to pump that production water that was bicarbonated water, pump it into the ore body, pump it out, goes into that column. They used to run that water through there and they used to run those resin beads back into another column on the site so there's two columns standing up. They used to pump all that resin beads in to that other column, and they used to pump used resin beads in that other column again.

19. They ran a high concentration of acid to flush that uranium off the resin beads, so it was two different things going on at same time. When you see that water come out, it's almost yellow. Then they used to run it into different tanks. Those tanks were 3000 gallon tanks and they used to run some chemicals in there to extract uranium, then they used to pump all that water that had been extracted back into the ground. Then they'd do the same cycle again.

20. All that mined ore would come out as a slurry. They used to pump it into other tanks. Then they dropped the pH level; they used to drop it so all that ore would come to a slurry, kind of like mushy mustard.

21. I think we did that for about a year and a half. Production lasted about a year and a half.

22. Then, all of a sudden they said, "okay, we're going to slow this down. We won't add any bicarbonated water into the ground anymore, so we can start our reclamation, restore the water in the ground." So that's what they were doing for another six months. I think something was going on with the price of uranium.

23. I think Mobil was trying to convince companies that this could be done. This could be cleaned up. So, they start doing that restoration operation for about three years.

24. Nothing happened. Nothing really changed. Groundwater was still contaminated. We had a lot of problems with molybdenum. Molybdenum was always in the way. There was also uranium. There were also high concentrations of iron. They tried to clean that up as much as they could. They were not successful on that.

25. All the chemists and engineers were really upset about how the restoration operation was going. There was more wastewater. There used to be one waste pond which was about 300 by 300 feet across and then probably 20 feet deep. That thing filled up.

26. They made another waste water pond. They opened that up, they filled it up. They couldn't restore the water back into the ground the way it should be done. That second pond filled up. A third pond was being built. So what that did was they let some of that waste water go out on the field west of the mining area.

27. I didn't like what they were doing, I said, "hey, you guys can't do that." I thought this thing's supposed to work. But the engineers were really getting upset. Why can't we succeed with this, why can't we clean this water?

28. They were getting upset with us. The chemist I worked with, he quit. He went home. So I was left dealing with the engineer. They brought in the water samples to the lab, and I used to run tests for them. The engineer would say, "Capitan, are you doing the right thing?" I'd say, "yeah, that's how I was taught."

29. Nothing changed. There was still molybdenum in the groundwater. And still some uranium in there. And some other elements that were still in that water, the common contaminants. So I felt like the restoration operation wasn't successful.

30. Finally, they said, we are just going to close this down. We didn't succeed. I don't think this is safe. It's not going to work. So I thought, well, okay, I guess this is not my future right here. They decided not to mess around with it.

31. All the wastewater that they had, they had to ship it to somewhere in Utah. There's a place where they put all their contaminated water; they hauled it out there and finally cleaned up those waste ponds. Three of the waste ponds, they shipped all that water out and they just decided to close that ISL plant. They closed it down. The mine closed. I didn't have a job anymore.

32. That's how I learned a lot about how ISL mining works. They weren't successful. I used to come home and let Rita know that groundwater restoration wasn't succeeding; everybody's just getting upset in the lab, all these engineers. Sometime they would call another guy from a different place, and they would run the tests with them, but came up with the same results.

33. When I saw the NRC's draft EIS, I wondered "how are they gonna do all this stuff again?" I didn't think it would work. Look what happened to our Mobil Oil Section 9 mine. It didn't work out here.

34. I related that information in Navajo to a lot of the people that were involved with our group [ENDAUM]. I helped them as far as what was being said, scientifically, what it meant to me as a Navajo and put in Navajo words to help them understand what could happen and what had happened with the Mobile Section 9 ISL mine. I said, it didn't work there. Why is it going to work here with HRI?

35. After the Mobil mine shut down, I started working for Navajo Tribal Utility Authority. I worked out in the field. I started with being a meter reader. That's where I learned that Crownpoint has the best water. We don't really have to add anything. It is really naturally good. All NTUA added was a little bit of chlorine to keep it fresh. And it was being used in a lot of these areas, like Crownpoint area, Little Water area, Becenti area, Dalton Pass area, Standing Rock and all those chapters around this area; they enjoy the Crownpoint water.

Q: Did it surprise you when the NRC said it would be okay for HRI to mine uranium in the aquifer that supplies Crownpoint's drinking water and to all those other communities around it?

36. **A:** Yes. I was really upset with that. Crownpoint water is so good.

37. I was comparing Crownpoint's water to other chapters' water, like Smith Lake. There used to be a conventional uranium mine in the Smith Lake area. They sure did mess up the water table out there. In that area, the water is not that good. A lot of people don't drink that water - all they use it is for is washing, restrooms and things like that. They say that water is so bad.

38. Even Casamero Lake is like that. Their water is not that good. Thoreau's water is like that. Thoreau has a lot of iron in it and they have problems with that. Even Churchrock is like that - some of those areas have mining near them and look what they left. That's what I sure don't want to see happen with HRI.

Q: How many communities do you think rely on Crownpoint water in addition to Crownpoint?

39. **A:** Smith Lake likes our water. I've seen people get their water source from here. Even Standing Rock is like that, they haul water from Crownpoint to their place for drinking and household use. Lake Valley is not that bad but some of them still come for Crownpoint water. Crownpoint is kind of like a hub for good water.

Q: Does it make sense to you based on your experience with the Mobil ISL mine, that the NRC used that Mobil as the basis for HRI's groundwater restoration goals?

40. **A:** No. It's just they just want to make the money is all it is. They're just going to get away with something out here and we are going to struggle with that for all the years. Somebody had to say something. That's what we did.

Q: Can you talk a little bit about the way Navajo people talk and think about water versus non-Navajos?

41. **A:** I really think that for non-Navajos and some Navajos it's just about money - how people will be paid. Just as a few land owners didn't really care about the other families in their community. The mining company only thought about making money. Just going after that uranium - that's all they were thinking about.

42. What we learn, as Navajos, is that we are really bound together. We should care for one another. But once money is involved a lot of our traditional ways as far as being friendly, being as a family are disrupted.

43. We have a lot of doone'e (clanship). We really are bound together. The HRI proposal kind of broke up a lot of things. It disrupted a lot of things.

Q: Does water figure into the idea of being bound together?

44. **A:** Yes. What I learned on that was from Mr. Billy Martin. He is traditional, he's learned a lot of tradition. He was an older man. He's probably in his 90s now. He's still living, and he had a lot of sense of how water is sacred. Water is life, you know, that's where it really came from.

45. When we used to talk to a lot of audiences we'd say that water is life - *Tó éí iiná*. If we don't have water, we can't live. Our animals, our plants, everything's made with water. This teaching in the Navajo traditional way, water is very important.

46. We have prayers for water, prayers for rain, all these things interact together. If our livestock get sick from poisoned water, we also get sick. Even our plants will die. The medicine man used to always say, "I'd like to do a prayer for water or I'd like to sing for moisture that we have moisture that we always yearn for, for us, for our livestock, for our plants, for our Earth." All those things interact together. Our livelihood would be damaged with mining.

Q: Did anybody from the NRC ever ask you about the right way in Navajo to talk about water and uranium?

47. **A:** No. Things weren't done in a good way. All the NRC said was the water can be restored and ISL works. They said the good thing about this is that people will get jobs, they're going to be working, and you'll get economic development. At least that is what we were promised.

48. The thing that they promised, it didn't work for us before and why are we going to take it? We kind of learned from the other side to understand that uranium is not good for us.

49. What's happened in Churchrock - it's been real bad. I've been out there at their site where NRC and all those companies that did underground mining. It's a big mess, where they left some big buildings and contaminants.

Q: Did anybody from HRI ever ask the community about cultural issues with uranium and water?

50. **A:** No. All they talked about was mainly jobs and money. And how mining companies develop community, but they never said anything about contamination and how it will disrupt the water.

Q: How did the NRC process affect you?

51. **A:** It was very divisive. The way the mining company was promising people lots of money, to me, I thought it was bad, and how they used some of our Navajo leaders, like the Council, and even our president. They used Rita's uncle, the late Leonard Arviso. He was really for uranium. And we split up. We used to be good, friendly people with one another. He said, "why are you speaking against this for your people to enjoy, to develop their jobs and our companies here?" I think he was thinking about his own company - he used to have a gas station here in Crownpoint. He thought about all the money that was promised from this company and he kind of supported that.

52. It disrupted our clanship, our friendship in a way that we learned from our leaders. Even our leaders, some supported mining and some didn't. I was really, really happy that some of our leaders really supported us. Some of our Navajo people that are well known, a lot of decent leaders that got involved, had really supported us.

53. We didn't go for the promises of money and continue to go against the NRC and HRI.

54. It bothered me, but we just had to keep going because we thought this was very important.

Q: Can you talk about health impacts either to your family or your friends from the uranium industry?

55. **A:** There's some things I heard from some of my friends that were impacted health-wise by some of the past mining. Some local area miners went through cancer. There was another lab technician at Mobil who later died from breast cancer.

Q: You talked about how when you worked for Mobil they buried pits waste solids and leached material. Later, residential houses were built over that area – is that correct?

56. **A:** Yes, that surprised me. I don't think they really covered that mining site. It was kind of left alone. And I was worried about it and I asked that question, is that contaminated? How bad is it? They said, it's alright, Capitan.

57. There's a home about I would say about 100 yards from where the three waste ponds were located. It was right in that area where it was fenced, but that fence is gone now. So, they just left it like that.

58. I look at these mining companies, how they leave things and how they say that we are safe. But things are often left right there. So that's another concern that I have with the mining companies. I don't know if the Mobil Section 9 areas have been tested for contamination or is being tested, throughout the year. I don't know who has the information.

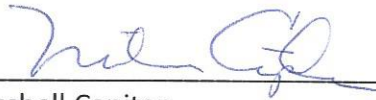
Q: Do you remember whether Mobil did any groundwater monitoring after it went out of business?

59. **A:** I think they did for a while. Because when they did some reclamation, shutting down production wells, they injected clean water back into the ground. I think they did some sampling. But the cleanup wasn't good. They tried to clean that water up, but there were still contaminants.

60. At one time one of the landowners in the area he was asking me, can they pump some water for livestock, I said I'm sorry I don't think they can; they probably won't let you do that, it's been contaminated. I don't know if it's been restored to where it's safe.

61. I don't know if there are still contaminants or if they've spread. This is what we learn from. What the mining companies promised us, that they can clean up lot of things. But after, they didn't do any good. They're gone. That's what we don't like to see.

I swear or affirm under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge.



Mitchell Capitan

Date: 10-18-21

BEFORE THE INTER-AMERICAN COMMISSION OF HUMAN RIGHTS

DECLARATION OF CHRISTOPHER L. SHUEY

I, Christopher L. “Chris” Shuey, do hereby swear that the following is true to the best of my knowledge. I am qualified and competent to give this declaration, and the factual statements herein are true and correct to the best of my knowledge, information and belief. The opinions expressed herein are based on my best professional judgment.

Name and Title

1. My name is Christopher L. “Chris” Shuey. I am the director of the Uranium Impact Assessment Program at Southwest Research and Information Center (“SRIC”) and lead of the Community Engagement Core for the University of New Mexico’s METALS Superfund Research Center. My mailing address is P.O. Box 4524, Albuquerque, NM 87196. The factual information and published research findings presented in this Declaration were developed, in part, under research awards to the University of New Mexico and Southwest Research and Information Center. It has not been formally reviewed by any funding agency or organization. The views expressed are solely mine and do not necessarily reflect those of the agencies, organizations and research collaborators cited herein.

Purpose of this Declaration

2. This testimony has three main purposes. First, I update the record on the critical importance of increasing access to safe drinking water sources in the Eastern Navajo Agency, including protecting and preserving the Westwater Canyon Aquifer, which is the principal, and often sole, source of drinking water in communities potentially impacted by the proposed in situ

leach (“ISL”) uranium mine that is the subject of the Eastern Navajo Diné Against Uranium Mining (“ENDAUM”) May 2011 Petition before the Inter-American Commission on Human Rights (“Commission”). Second, I provide additional data, information and analysis to establish that residents of the Eastern Agency, including members of ENDAUM, are routinely and chronically exposed to uranium in mine wastes, contaminated soils, and certain drinking water sources, and that these exposures manifest as adverse health conditions. And third, I describe, summarize, and synthesize studies that have been done by university research programs of which I have been a contributing environmental health scientist since the mid-1990s. Extensive research on the environmental and biomedical impacts of exposure to uranium and other chemical and radiological substances in abandoned uranium mine (“AUM”) wastes, drinking water sources and non-impacted soils has been conducted by the University of New Mexico (“UNM”) in partnership with SRIC and numerous other academic, regulatory and nongovernmental organizations since the ENDAUM Petition was submitted to the Commission in May 2011. From my professional perspective, results of studies I will discuss in this Declaration support the Petition’s allegations that the United States violated Articles 1, 11, 13 and 24 of the American Declaration of the Rights and Duties of Man (“American Declaration”).

Professional Qualifications

3. My education and experience as an environmental health scientist and public health professional are described in my biosketch, attached to this Declaration as **Exhibit A**. I have a B.U.S. (Bachelor of University Studies) (1990) from UNM and a master’s in public health degree from UNM (2002). I have 40 years of experience working with and in Native American communities impacted by past and prospective uranium mining and milling. I served as the lead scientist for SRIC and technical liaison to other experts in ENDAUM’s administrative challenge

of the proposed Crownpoint Uranium Solution Mining Project between 1994 and 2011. During that time, I worked closely with members of ENDAUM and with their attorneys at the New Mexico Environmental Law Center (“NMELC”) in reviewing relevant technical information, preparing briefs, working with experts on their expert testimonies, and briefing Eastern Navajo Agency (“ENA”) chapters on progress of the administrative adjudication.

4. Over the past four decades, I completed course work and conducted numerous field studies in groundwater science, water quality sampling and analysis, uranium waste characterization, radiation detection and assessment, design and implementation of epidemiological and biomedical studies, statistical analysis of environmental data, and survey administration and analysis. In addition to my degrees, I have certificates of completion in impacts of energy development (1983), groundwater hydrology (1986), assessment of Naturally Occurring Radioactive Materials in oil and natural gas operations (1993), and use of the MARSSIM¹ strategy for advanced assessment of radiological contamination (2012). I was also a member of a UNM research team, led by Dr. Johnnye L. Lewis, director of the UNM Community Environmental Health Program (“UNM-CEHP”), that produced a comprehensive report (Malcewska-Toth, et al., 2003) summarizing the world’s literature on the toxicity of uranium for the New Mexico Environment Department (“NMED”) in 2002-2003. Based on my work on that report and my training in environmental health principles, I testified as an expert witness before the New Mexico Water Quality Control Commission (“NMWQCC”) in support of lowering the state’s uranium groundwater protection standard from 5 milligrams per liter (“mg/l”) to 0.007 mg/l, based solely on health risks. The Commission eventually adopted a standard of 0.03 mg/l, based in part on the well-documented toxicity of uranium (“U”) as a

¹ USEPA Multi-Agency Radiation Survey and Site Investigation Manual, available at: <https://www.epa.gov/radiation/download-marssim-manual-and-resources>

kidney toxicant. and in part, to be consistent with the U.S. Environmental Protection Agency's ("USEPA") national drinking water standard of 30 micrograms per liter ("µg/l") (40 CFR 141).

5. Presently, I am a co-investigator in four environmental health/biomedical studies ongoing in Native American communities in the Southwest. These are the Diné Network for Environmental Health Project, Navajo Uranium Assessment and Kidney Health Project ("DiNEH Project") (2001-2012), Navajo Birth Cohort Study-Environmental influences on Children Health Outcomes ("NBCS-ECHO+") (2010-present), Mine Dust Toxicity Project (2015-present), and Thinking Zinc pilot clinical trial ("Thinking Zinc") (2018-present), a community-based participatory research program of the UNM METALS Superfund Research Program ("SRP"). I have been certified in human subjects protections for biomedical investigators for 20 years and in Good Clinical Practices associated with conducting a pilot clinical trial on the Navajo Nation over the past three years. These certifications are current, and must be renewed every two to three years. I am practiced in applying for and obtaining permits to conduct research involving human beings from the Navajo Nation Human Research Review Board ("NNHRRB") and the UNM Human Research Protections Office.

6. I was intimately involved in planning, design, implementation, field sampling, participant consenting and enrollments, data analysis, and writing of presentations and manuscripts for each of these major projects. I am a listed co-author in 12 academic journal (i.e., peer-reviewed) articles reporting results of environmental and biomedical studies on the Navajo Nation, and I have written and prepared dozens of slide presentations for impacted communities, decision-makers, and local, regional and national conferences over the past 30 years. Some of these materials are listed in my biosketch; others are listed below in Paragraph 13.

7. As a co-investigator for the DiNEH Project, I helped organize and conduct community meetings and trainings in the Crownpoint, New Mexico area of the Navajo Nation in 2001-2003 through a partnership with the Eastern Navajo Health Board (“ENHB”) and UNM-CEHP. From these sessions emerged two main concerns of Eastern Agency residents and healthcare providers – whether uranium in water sources played a role in what they described as the high rates of chronic kidney disease in the ENA, and whether uranium liberated into the local groundwater from ISL mining would increase levels of uranium in the sole-source regional aquifer that served more than 13,000 people in the region in 2005. These concerns laid the groundwork for development of the DiNEH Project’s Navajo Uranium Assessment and Kidney Health Project, a cross-sectional study of uranium exposures and health in 20 chapters of the Eastern Agency.

8. To address the community’s concerns, the UNM-SRIC team, in collaboration with community leaders and members and staff of ENHB, developed and administered a 45-question exposure survey in both English and Navajo, obtained location information for participants’ homes using GPS locators, extracted data on 100 abandoned uranium mines and mills in the study area from the USEPA database (USEPA, 2007), sampled more than 100 water sources and worked with tribal and federal agencies to compile water quality data for another 30 water sources, held 14 community collection events over a 12-month period to collect urine and blood samples from study volunteers, matched consumption of water from multiple water sources based on participant survey responses, calculated individual doses of key metals including uranium, and carried out statistical analyses of survey, geospatial, water quality and biomonitoring data. In all, our team surveyed 1,304 persons, of whom 267 consented to provide blood and urine samples for evaluation of possible exposures. I personally sampled the vast

majority of 130 water sources used by participants in the DiNEH Project, reviewed survey responses reported by our Navajo-speaking field researchers, and participated in 13 of the 14 community collection events. Blood and urine samples provided by study participants were analyzed for trace metals, biomarkers of effect, and standard clinical measurements. (This is a form of exposure assessment referred to as “biological sample collection” or simply “biomonitoring.”)

9. As the study proceeded, our team observed that proximity to mine waste sites emerged as a consistent predictor of several chronic metabolic diseases. I will discuss this important finding in more detail later in this Declaration.

10. Concurrent with the DiNEH Project, I managed field operations for the Church Rock Uranium Monitoring Project (“CRUMP”), a joint study with Church Rock Chapter of the Navajo Nation, with collaborations with USEPAS Region 9, the Navajo Nation Environmental Protection Agency (“NNEPA”), the Navajo Nation Abandoned Mine Lands Department (“Navajo AML”), and graduate students from Tufts University and Stanford University. A community-wide gamma radiation survey, coupled with sampling and analyses of water sources and soils in non-impacted areas of the Church Rock Mining District, and soils near residences located near the Northeast Church Rock Mine (“NECRM”) and Quivira Mining Co. Church Rock I and IE mine (“Quivira”) provided exposure data for more than 2,000 residents of parts of Church Rock, Coyote Canyon, Mariano Lake, Nahodishgish, Pinedale, Smith Lake and Standing Rock Chapters. These data not only provided exposure information, but were instrumental in defining “background” gamma rates, indoor radon, uranium in soils, and metals and radionuclides in drinking water sources in the region. In this Declaration, I use the terms “non-impacted” and “background” to mean natural resources not affected by human activities, such as

mining. The terms “non-impacted” and “impacted” come from the USEPA MARSSIM manual referenced above.

11. Together, CRUMP and the DiNEH Project provided extensive exposure data for the 1,304 participants living in the 20 ENA chapters, including 11 communities impacted by past uranium mining and milling. Nine peer-reviewed papers, three research reports, numerous conference presentations, and more than 30 community report-backs have resulted from these studies over the past 20 years. When viewed in the aggregate, this collection of research supports the Petition’s assertions that key provisions of the American Declaration were violated by the United States’s approval of a uranium ISL mining project in the communities of Church Rock and Crownpoint. These Navajo communities, called “chapters,” along with at least seven other ENA chapters, depend on the same normally high-quality aquifer (called the Westwater Canyon Member or Westwater Canyon Aquifer) that the proposed ISL project would purposely contaminate to recover uranium from the subsurface for commercial exploitation.

12. Currently, I serve as the lead of the Community Engagement Core of the UNM METALS SRP. “METALS” stands for Metals Exposure Assessment on tribal Lands in the Southwest. My role bridges community members exposed to AUMs with earth scientists developing novel methods for assessment and remediation of AUM wastes and biomedical researchers studying the toxicities of mines dusts and exposure patterns and health outcomes among community members. I also work with Native American community members to advance Indigenous Science and Traditional Ecological Knowledge (“TEK”) that is integrated with traditional Western academic science. The UNM METALS SRP addresses community questions about exposure and toxicity of uranium mine wastes through interdisciplinary research involving a diverse team of toxicologists, engineers, mineralogists, geographers, modelers, social

scientists, immunologists, statisticians, data scientists, and most important, members and leaders of four Native American communities impacted by uranium mine wastes: The Pueblo of Laguna

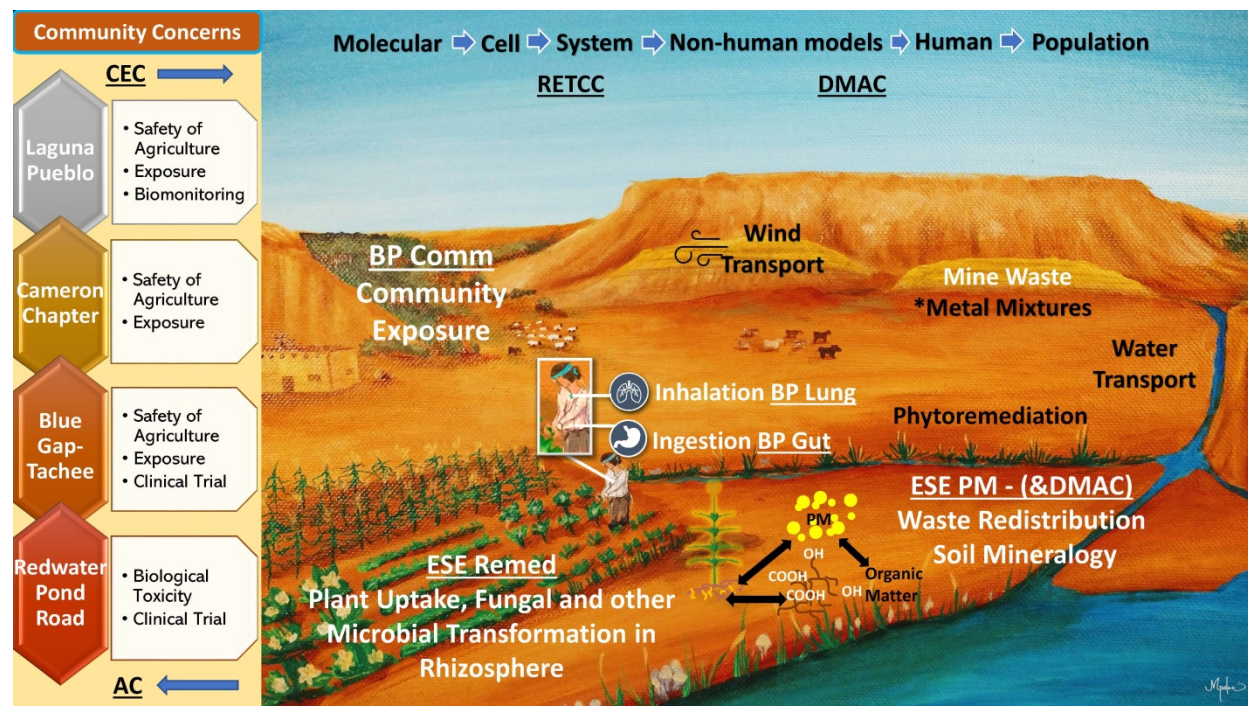


Figure 1. UNM METALS Superfund Research Center conceptual model.

(Jackpile Mine), Red Water Pond Road Community Association (“RWPRCA”) of Coyote Canyon Chapter of the Navajo Nation, the Blue Gap-Tachee Chapter of the Navajo Nation, and the Cameron Agricultural Ad Hoc Committee (“CAAHC”) in Cameron Chapter of the Navajo Nation in north-central Arizona. The METALS team conducts primary environmental and biomedical research on contaminant migration and bioavailability in communities where AUMs are subject to assessment and remediation under the federal Superfund law. An infographic designed by Zuni Pueblo artist Mallery Quetawki (**Figure 1**) illustrates how community concerns drive the METALS Center’s research into the environmental and biological effects of wind and water erosion of mine wastes on community health, livestock and crops. .

Professional Papers, Conference Presentations, Relevant Literature

13. The following list of peer-reviewed papers, conference presentations and other relevant literature contains research that I was involved directly in and reports and publications relevant to ENDAUM's 2011 Petition claims. The Petition contained many other citations for which I am familiar with the contents, including and especially pleadings of ENDAUM and SRIC during the administrative adjudication of License No. SUA-1580, issued to Hydro Resources Inc. ("HRI", also known as Uranium Resources Inc., or "URI") by the U.S. Nuclear Regulatory Commission ("USNRC") in January 1998.

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A. Importance of Safe Drinking Water – The Need to Protect the Westwater Aquifer for Current and Future Water Needs of the Eastern Navajo Agency

14. The urgent need for improved access to safe drinking water on the Navajo Nation was underscored during the COVID-19 pandemic when so many families who did not have running water in their homes sought clean water for handwashing and drinking. To address this problem, in May 2020 the Navajo Nation and U.S. Indian Health Service formed the Navajo Nation COVID-19 Water Access Coordination Group, called “WACG”, to oversee the construction of 59 new safe-drinking water access points at Chapter Houses in communities with high numbers of COVID cases and high proportions of homes without piped-in water.

Academic organizations and nongovernmental organizations working on water quality and water access issues, including Dr. Lewis and myself, were invited to join the WACG to share research findings related to water and strategies for increasing communication and action surrounding water supplies and water quality. An educational and outreach program was developed by the group, starting with an interactive website, navajosafewater.org, and continuing with radio and newspapers ads urging families who don’t have running water in their homes to obtain safe drinking water from the 59 new “transitional” watering points and from 60 existing permanent water points. Five-gallon water containers were handed out to families to facilitate safe hauling of regulated water to their homes and safe handling practices at the home. The effort was supported by Navajo Nation leaders, including President Jonathan Nez who appears in both English and Navajo videos on navajosafewater.org encouraging residents to visit the water access points at their local chapter houses.

15. The WACG initiative highlighted the broad need for access to safe drinking water throughout the Navajo Nation, and particularly in Eastern Agency chapters potentially impacted by the proposed Crownpoint Uranium Solution Mining Project (**Figure 2**). As summarized in the 2011 ENDAUM Petition, and as

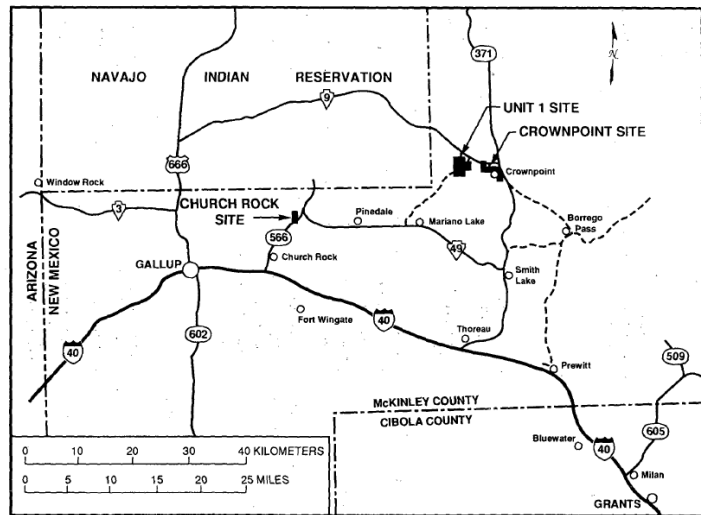


Figure 2. Map of the Crownpoint Uranium Solution Mining Project, McKinley County, NM. From USNRC, 1997.

described in Dr. Richard Abitz's declaration supporting ENDAUM's Additional Observations on the Merits before the IACHR, the proposed ISL mining would leach uranium from its resting place next to humate deposits in the Westwater Canyon Member of the Jurassic Morrison Formation by injecting oxygenates into the groundwater. Production wellfields would be installed on contiguous parcels in Church Rock Chapter (Sections 8 and 17), along with a satellite processing plant to separate the recovered uranium from mining solutions. In the Crownpoint area, wellfields and gathering lines would be installed at the Unit 1 project site 3 miles west of town. Wellfields and a central processing plant would be constructed on the southwest corner of the town of Crownpoint (**Figure 2**). ENDAUM's 2011 Petition to IACHR described in detail how ISL mining works and the impacts it has had on groundwater quality at ISL operations in Texas, Wyoming and Nebraska (Petition at 23-28). The Petition also explained how the uranium is deposited in ancient buried streambeds at the proposed Crownpoint and Church Rock ISL mines (Petition at 22-23) (**Figure 2**), and that the formation that contains the uranium, the Westwater Canyon Aquifer ("WCA"), is also the regional aquifer

that supplied drinking water to an estimated 13,000 people in 2005 (Petition at 14). The Petition cited the testimony of Dr. John Leeper, a water engineer formerly employed by the Navajo Nation Department of Water Resources, who said that the Navajo Nation identified the Westwater Canyon Aquifer as the most important groundwater resource for future drinking water supplies in the Eastern Agency (Petition at 13-14). The Final Environmental Impact Statement (“FEIS”) for the ISL project (USNRC, 1997) contained data showing a stark contrast between the natural water quality in wells serving the town of Crownpoint and the projected concentrations of uranium and other contaminants in the “pregnant lixiviant” that would be produced from the aquifer during the ISL mining process. Uranium concentrations, for example, could increase sixfold from 0.001-0.007 mg/l to between 50 and 250 mg/l (FEIS at 2-6, Table 2.1, and at 3-26, Table 3.12). In his Declaration supporting ENDAUM’s Additional Observations on the Merits, Dr. Abitz describes the consequences for groundwater quality and the safety of the local water supply if pregnant lixiviant were to migrate beyond the facility’s monitoring well ring and invade one of the town’s two water supply wells located less than one-half mile from the Crownpoint processing plant.

16. While it has been 15 years since Dr. Leeper’s testimony, the status of the Westwater Canyon Aquifer as major source of high-quality drinking water in the Eastern Navajo Agency has not changed. The Navajo Nation’s 2011 Water Resource Management Strategy (“WRMS”) listed the “M-Aquifer” complex as an important source of groundwater for municipal and agricultural uses in the Eastern Agency (NNDWR, 2011, Figure 3.1a). “M” signifies the Morrison Formation, which contains the Westwater Canyon Member. The WRMS predicts that even with completion of the Navajo-Gallup Water Supply Project, groundwater production will still be needed in 2040 to meet anticipated growth in municipal demand across all chapters now

dependent on the WCA for most of their drinking water (NNDWR, 2011 at Table 6.4). The Strategy projects that populations of the communities tapping the WCA for drinking water are expected to grow by 3.4 times between 1990 and 2040.

17. Since 2010, the UNM/SRIC research group has compiled water quality data for unregulated and regulated water sources across the Navajo Nation. DiNEH Project data from the sampling of 130 water sources in the Eastern Agency between 2001 and 2011 became the foundation for a database that totaled nearly 500 water sources through 2016 (Hoover, et al., 2017). I am familiar with most of the unregulated water sources in the Eastern Agency, having personally located and sampled them as part of the study's exposure assessment plan. Water quality data for public water supply ("PWS") systems were obtained from Consumer Confidence Reports ("CCR") published online by the Navajo Tribal Utility Authority ("NTUA"; <https://www.ntua.com/2020-ccr.html>), which operates most of the PWS systems in the Navajo Nation. We compiled and analyzed water quality in more than 20 public water systems serving the Eastern Agency to calculate annual consumption of metals among DiNEH Project participants who self-reported autoimmunity. (See discussion of recent health studies in Section C of this Declaration.). Overall, water quality in wells serving PWS systems in the Eastern Agency has remained generally good over the past 15 years. Between 1991 and 2011, uranium concentrations in the Crownpoint Public Water System (PWS# NN3503039) ranged from less than 0.001 mg/l to 0.0238 mg/l, with an average of 0.007 mg/l – well below the MCL of 0.03 mg/l, or 30 µg/l. In the past several years, however, the U concentrations have increased in the Crownpoint PWS system, averaging 0.025 mg/l (25 µg/l) between 2010 and 2020.

18. Even if uranium concentrations are trending upward in wells tapping the WCA in Crownpoint, the aquifer remains a long-term, vital water source for municipal and agricultural

uses in the Eastern Agency. Should ISL mining commence, the aquifer will be subject to purposeful contamination, that, if allowed to escape undetected, could jeopardize the good quality water in Crownpoint's PWS and potentially limit development of new WCA-derived water supplies next to the Sections 8 and 17 ISL mine sites in Church Rock Chapter.

Contaminated drinking water would require substantial investments in treatment, or wells would have to be shut in to protect public health from exceedances of drinking water standards. As our team demonstrated in the 2003 ground-water protection standard hearing before the NMWQCC, use of the Precautionary Principle is warranted when there is broad uncertainty about the potential future effects of exposures to known toxic and radioactive substances (Lewis et al, 2007). It would have been prudent, therefore, for the U.S. Nuclear Regulatory Commission ("USNRC") not to have licensed ISL mining that introduces a known kidney toxicant, uranium, and potentially, carcinogens like arsenic and radium, into an otherwise high-quality regional aquifer. That NRC did just that jeopardizes ENDAUM members' right to life and health.

B. Legacy Uranium Mine Wastes Contribute to Widespread Exposures Among Residents of the Eastern Agency and the Navajo Nation

19. Uranium's natural chemical behavior in the environment was summarized in the ENDAUM Petition (at 19-20), and the chemical and radiological changes that occur chemically in the groundwater during ISL mining were described in the Petition at 24-25. Uranium's natural chemical behavior is widely understood though many decades of research (ATSDR 2013; Deutsch et al., 1985; Deutsch et al., 1983). When exposed to oxygen introduced into the groundwater flowing through the orebody, or when ore (rocks containing economically recoverable uranium) is brought to the surface for processing, uranium in these media rapidly oxidizes from its tetravalent form (+4; also written IV+) to its hexavalent (+6; also written VI+)

form (ATSDR 2013 at 270). (While U exists in several valence states, U-IV and V-VI are the most relevant valences for oxidation-reduction reactions in ISL mining.) As noted above, uranium IV “lives” in ore deposits formed next to humates (carbon-rich rocks formed from ancient decaying plant materials) within the Westwater Canyon Member (FEIS, 3-6 through 3-10). In its natural depositional environment, uranium in the earth is relatively immobile and insoluble, meaning the uranium ions and compounds do not readily dissolve in the groundwater that passes through the geologic strata because the humate deposits are “reduced,” or lack oxygen. However, when exposed to oxygen in the aquifer through ISL mining processes or in rock matrixes brought to the surface of the land for processing, U-IV (+4) rapidly “oxidizes” to U-VI (+6), which is highly soluble and readily dissolves in water, or even in soils with low moisture content.

20. This oxidation-reduction process has been demonstrated in field studies conducted in the Red Water Pond Road Community (“RWPRC”) near the Northeast Church Rock Mine (“NECRM”) – the largest underground mine on the Navajo Nation and one of three uranium facilities impacting residents of the Church Rock Mining District. (Site descriptions and regulatory documents for NECRM are available at <https://www.epa.gov/navajo-nation-uranium-cleanup/northeast-church-rock-mine>.) The studies were carried out by Jamie deLemos and Christine George, graduate students in geochemistry and environmental engineering at Tufts University and Stanford University, respectively, between 2003 and 2006. (Ms. deLemos is now a Ph.D. geoscientist with a Boston-area consulting firm and Ms. George is now a Ph.D. scientist at Johns Hopkins University.) They volunteered to assist the CRUMP study in sampling soils, mine wastes and surface waters around the Northeast Church Rock Mine within 600 feet of residences in the Red Water Pond Road Community of Coyote Canyon Chapter, Navajo Nation.

Dr. deLemos described results of her field and laboratory research in a paper published in the prestigious journal *Environmental Science and Technology* in 2008 (deLemos et al., 2008). She concluded that uranium rapidly dissolves (i.e., becomes “mobile”) in surface water and in soils having limited soil moisture, suggesting that uranium can be transported across many miles from its source via surface water flows, or it can infiltrate and move readily through surface soils. In 2007, I collaborated with Drs. deLemos and George to show that uranium concentrations in soils in places impacted by mine wastes *increase* with depth to levels more than 40 times greater than “background.” As shown in **Table 1** below, taken from our presentation at the 2007 American Public Health Association Annual Conference, U concentrations in non-impacted (i.e., natural soils) ranged from 0.3 mg/kg to 2.6 mg/kg with a median value of 0.7 mg/kg – or 3.9 times *lower* than the crustal average for uranium of 2.76 mg/kg (Herring, 2012). (A milligram per kilogram, dry weight, is equal to 1 part per million.) Analyses of these data showed that the concentrations of uranium in the top 3 feet of soils next to the Northeast Church Rock Mine were significantly elevated over U concentrations in “background” soils (Shuey et al., 2007).

Table 1. Comparison of Uranium Concentrations in Non-impacted, or “Background,” Soils with Soils Impacted by Uranium Mine Wastes, Church Rock Mining District.

Descriptions of Sample Sites	# Samples	Range U in Soils (mg/kg)	Median U Soil (mg/kg)
“BACKGROUND” – NON-IMPACTED* SOILS (2”-6”) in region surrounding Northeast Church Rock Mine (NECRM)	68	0.3-2.6	0.74
IMPACTED SOILS (2”-12”) Sample locations next to, but not on, NECRM	38	0.3-88.7	16.8
IMPACTED SOILS (>18-36”) Sample locations next to, but not on, NECRM	12	0.5-72.0	31.8
Crustal Average Uranium Concentrations		<1 – 12	2.76

*“Not impacted,” or “non-impacted,” means locations not affected by uranium mining and milling or other human activities that cause uranium and other substances to be increased in concentrations in surface soils.

21. This research, conducted near existing mine sites in the Church Rock area, provides further evidence of uranium's rapid oxidation to +VI when exposed to the surface and near-surface environments. Accordingly, it comports scientifically with the Diné traditional view expressed by ENDAUM founder Mitchell Capitan (ENDAUM Petition at 19) that once uranium is released from Mother Earth, it may cause widespread damage that would not have occurred had it been left in the ground. Diné teachings consider uranium to be a *Nayee'*, or monster, when it's released into the environment (NNC 2016, Sec. IV.1). And it further comports with findings from the Mobil Section 9 pilot ISL project – the most analogous actual ISL experience to the proposed Crownpoint Uranium Solution Mining Project because it was conducted in the WCA at a site only five miles west of Crownpoint – that U levels could not be returned to pre-mining baseline levels in the groundwater after nearly 6 years of failed restoration attempts (USNRC, 1988). Even the NRC staff admitted in the 1997 FEIS that “[s]uccessful restoration of a production scale ISL well field has not previously occurred. Further, site-specific tests conducted by HRI have not demonstrated that the proposed restoration standards can be achieved at a production scale” (USNRC, 1997, at 4-113). More than a decade later, a U.S. Geological Survey report (Hall, 2009) that examined ISL restoration efforts in Texas – the state with the longest history of ISL mining and with the most comprehensive database of restoration information – concluded that no ISL uranium mine restored groundwater to pre-mining conditions, or even to more relaxed standards that were inflated from pre-mining contaminant levels through variances granted to the operators (ENDAUM Petition at 26).

22. The inability of the ISL industry to demonstrate post-mining restoration of groundwater contaminated by ISL mining, coupled with the NRC's admission that commercial-scale restoration had not been achieved and that HRI's tests were also unsuccessful, belie the

agency's approval of the license that would allow HRI to pollute the Westwater Canyon Aquifer. In my professional opinion, there were ample reasons that the Crownpoint Uranium Solution Mining Project should never have been approved. That it was approved by the United States constitutes violations of Articles 1, 3 and 23 of the American Declaration.

C. Recent Health Studies Provide Evidence that Exposures to Mixed-metal Mine Wastes and Metals in Drinking Water Increase the Likelihood of Chronic Diseases and Adverse health Outcomes

23. In this Declaration, I have established that the Westwater Canyon Aquifer is a critical source of drinking water for the Eastern Agency, and therefore should be protected from purposeful contamination by ISL mining. I have also shown that once released from the Earth, uranium becomes mobile in aqueous environments, and like the proverbial horse escaping from the barn, cannot be corralled. Traditional Diné teachings, which the U.S. Government chose to ignore, support the view that uranium is a monster that is best left undisturbed in its place in Mother Earth. These findings now inform environmental and public health research that has been conducted since the ENDAUM Petition was filed in May 2011. In this section, I review the salient findings of several studies emerging from the DiNEH Project (**Figure 3**) and the Navajo Birth Cohort Study that demonstrate that even without ISL mining, the population of the Eastern Agency has already been exposed to uranium and other trace elements in mine wastes and water supplies and is already suffering from chronic diseases that can be exacerbated by their environmental exposures to uranium.

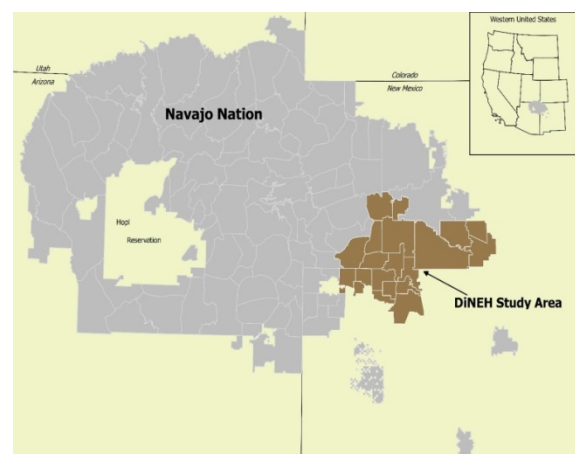


Figure 3. Map of the Navajo Nation with the DiNEH Project study area highlighted.

24. Based on survey results and published literature, I prepared a chart comparing national prevalence rates for diabetes (II), hypertension, heart disease and stroke compared with prevalence rates for these diseases among the full DiNEH cohort (N=1,304) and the subset of the cohort that donated blood and urine samples (N=267). The results, plotted in the chart in **Figure 4**, show that the two Navajo cohorts have higher prevalences of diabetes, hypertension and stroke than the U.S. population. Self-reported heart disease was lower among DiNEH participants, possibly due to confusion over the differences between hypertension and frank heart disease.

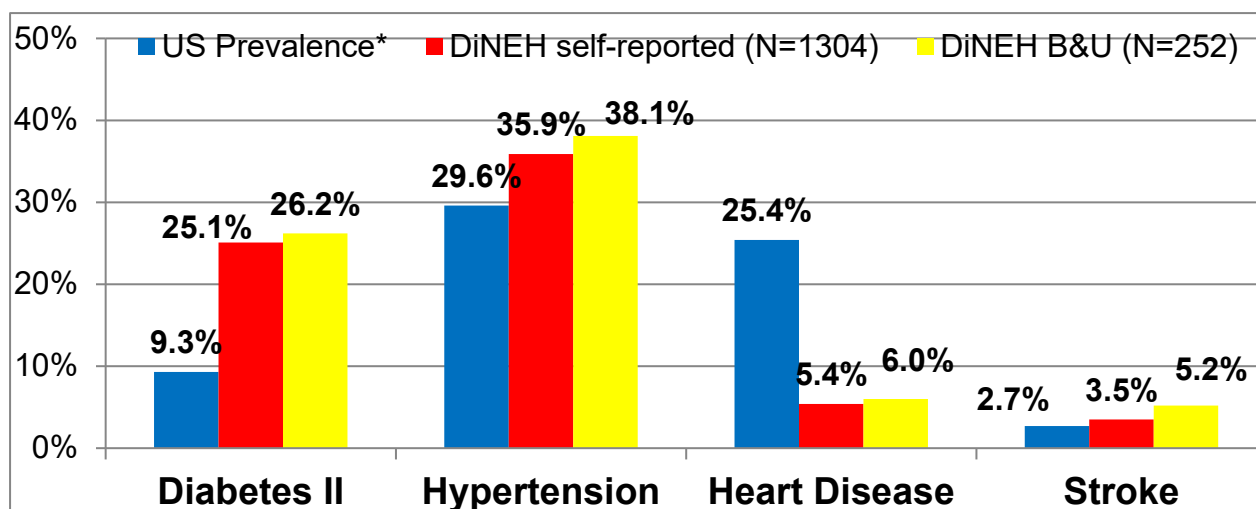


Figure 4. Comparison of national prevalences for diabetes-2, hypertension, heart disease and stroke with self-reported disease rates obtained from the full DiNEH survey data.

25. **Chronic Metabolic Diseases.** Section E of ENDAUM’s Petition (“Health Effects from Living in Proximity to Uranium Mines and Mills”) summarized preliminary findings of health studies that were ongoing in the Eastern Agency at the time the Petition was prepared and submitted to IACHR. Since then, findings largely from the DiNEH Project (**Figure 3**) have demonstrated an *increased likelihood* of certain chronic diseases and adverse health outcomes among Navajo residents having past and current exposures to metal mixtures and radionuclides in abandoned uranium mine wastes. A key finding across these studies is that proximity to abandoned mines is a consistent predictor of increased risk of chronic diseases in the study

population. This finding was first shown in Dr. Lauren Hund's analysis of self-reported health data and geospatial data acquired from the 1,304 participants in the DiNEH Project (Hund et al., 2015). Using advanced Bayesian statistical analyses², Hund found that proximity to waste sites and self-reported exposures to mine wastes through 13 different scenarios³ were found to increase lifetime risks of kidney disease during the active mining era (1950-1986) and of hypertension (i.e., high blood pressure) and a combination of chronic diseases that includes diabetes during the "Legacy Period" after 1986 when all of the uranium mines and mills in the Eastern Agency had closed. Furthermore, survey data showed that the median length of current residency of participants in the study was 32 years, suggesting that many residents of the study area, especially those living in the 11 uranium mining chapters, were chronically exposed because they tied to their place of residence through cultural norms.

26. Cardiovascular Disease ("CVD"). Hund's finding of an increased likelihood of cardiovascular disease among those living in proximity to mine waste and having come in contact with wastes during their lifetimes was further substantiated in the DiNEH Project biomonitoring program. For example, Dr. Molly Harmon et al. (2017) found that residential proximity to AUMs was related to increased blood serum inflammatory potential. Blood serum from exposed participants showed increased production of inflammatory markers linked to hypertension when incubated with vessel tissue (Harmon et al., 2017; Lewis, 2021). Harmon and colleagues (2018) also found that arsenic in mine wastes and water sources appears to

² Bayesian statistics is an approach to data analysis where available knowledge about parameters in a statistical model is updated with the information in observed data. The background knowledge is expressed as a *prior distribution* and combined with observational data in the form of a likelihood function to determine the *posterior distribution*. The posterior can also be used for making predictions about future events. (van de Schoot et al., 2021)

³ Mining Era exposures included working in a uranium mine, uranium mill, or uranium waste reclamation; washing the clothing of a uranium worker; or having lived in a mining camp. Legacy Era exposures included playing on or next to a uranium waste site, herding or sheltering livestock in an abandoned mine, being exposed to contaminated mine water, or having used mine wastes in construction of homes, barns and corrals (Erdei et al., 2019 at 18).

promote oxidation of low-density lipoproteins (oxLDL), a critical step in vascular inflammation and chronic vascular disease. The eroded condition of many abandoned mines and subsequent resuspension of metal-laden, fine-grained dusts suggest an air pathway is at the root of these cardiovascular effects (Zychowski et al., 2018). Exposures to mine dust produced increase contraction and decreased relaxation of vessels in mouse experiments, and the same responses resulted from controlled exposures to either uranium or vanadium, both of which are present in high concentrations in much of the mine waste on the Navajo Nation (Zychowski et al., 2018; Lewis, 2021; Blake et al., 2015).

27. Autoimmunity. Early in the DiNEH study, we observed that participants who self-reported having an autoimmune disease seemed to be concentrated in the uranium-mining chapters on the south half of the study area (**Figure 5**). A little more than half of the 267 participants who donated blood and urine specimens live in these impacted chapters. My colleague Dr. Esther Erdei, an immunologist and epidemiologist at UNM-CEHP, performed ELISA (enzyme-linked immunosorbent assays) tests on participants' serum samples to isolate four autoantibodies ("AuAbs") indicative of immune dysfunction. The four AuAbs were divided into two combinations for analysis: Combination 1 included anti-dDNA and anti-histone antibodies, which are termed xenobiotic and are usually induced by drugs or medications. Combination 2 included anti-chromatin and anti-nDNA

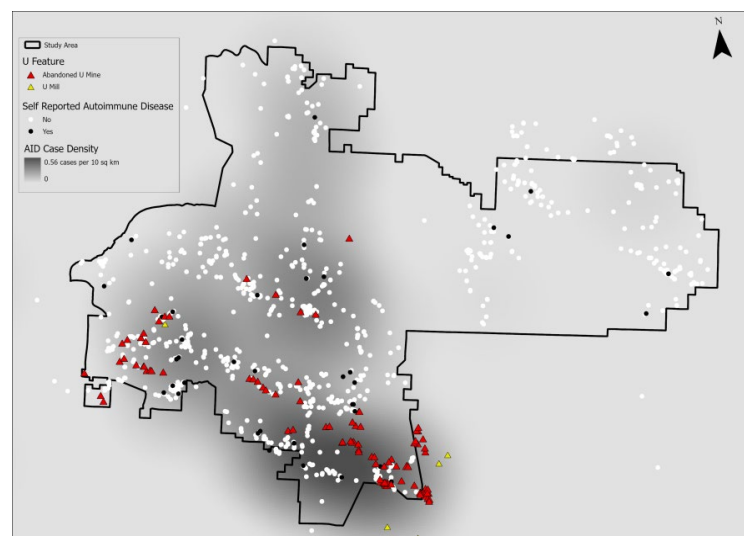


Figure 5. Map of self-reported autoimmune disease in DiNEH Project participants in relation to locations of abandoned uranium mines.

antibodies, which are referred to as idiopathic, meaning they denote any disease or condition that arises spontaneously or for which the cause is unknown. These AuAbs are believed to be environmentally induced, and often are associated with systemic lupus erythematosus, the most common type of lupus, which is an autoimmune disease.

28. Proximity to mine waste sites, mining era exposures, and consumption of uranium and nickel in drinking water were associated with an increased presence of xenobiotic AuAbs (Erdei et al., 2019). Age and the extent of exposure to legacy wastes were also associated with antibodies that are early indicators of medication-induced autoimmunity (Erdei et al., 2019). Legacy exposures, proximity to waste sites and consumption of uranium and nickel were associated with increased production of certain idiopathic autoantibodies, indicating an environmentally induced effect. Laboratory work by other members of the UNM team found that exposures to uranium and arsenic altered immune cells in the intestines of male and female mice (Medina et al., 2020), a finding consistent with the observations we made in the Erdei autoantibodies study. Furthermore, the association between increased AuAbs production and consumption of uranium in drinking water sources at average concentrations less than one-third of the 30 µg/l MCL suggests the need to further examine the adequacy of national drinking water standards to protect against uranium toxicity to the immune system (Erdei et al., 2019; Lewis 2021).

29. Key Findings from the Navajo Birth Cohort Study. More than 1,000 pregnant women and more than 800 babies are participants in the Navajo Birth Cohort Study, including some women and children living in uranium-impacted communities of the Eastern Agency (**Figure 6**). As the study has entered its eighth year, extensive biomonitoring found elevated urine-uranium levels in babies at birth, with U concentrations increasing from birth through age

5, at which time children show exposures similar to those of adults (Hoover et al., 2020). About 1% of babies *at birth* had urine-U concentrations equal to or greater than the concentration representing the 95th percentile of U.S. adults (Lewis, 2021; Hoover et al., 2020); 30% of babies had the same 95th percentile urine-U concentration at one year old.⁴ For NBCS adults, based again on biomonitoring results, from 25% to 50% of participants,

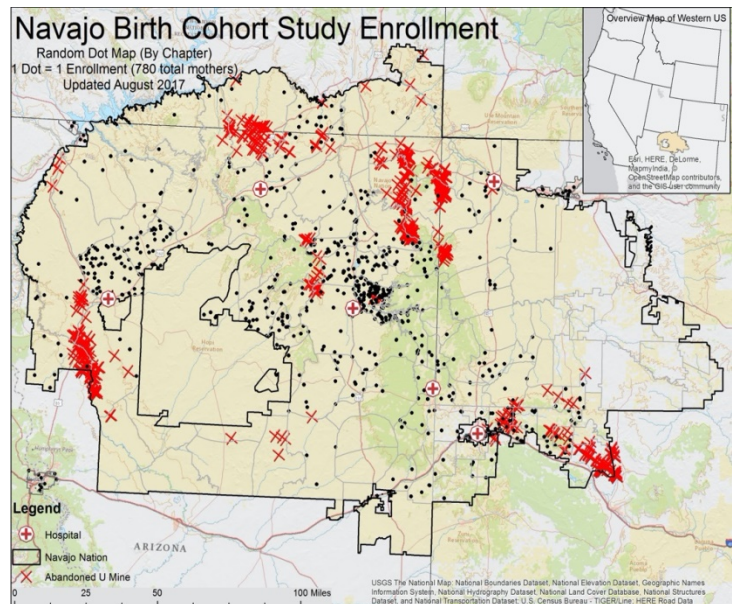


Figure 6. Map of Navajo Birth Cohort Study Enrollments as of August 2017 (black dots) and locations of abandoned uranium mines (red Xs). Map by J. Hoover, Ph.D.

depending on their community of residence, had urine-uranium levels greater than those found in 95% of US adult population. Furthermore, preliminary results indicate a two- to three-fold increase in the likelihood of preterm birth with community exposures to metal mixtures (publication pending). Previously, UNM scientists had linked uranium and other metals to increased DNA damage in NBCS women through increased oxidative stress and inhibition of the processes that repair cellular damage (Dashner-Titus et al., 2018; Cooper et al., 2015). They also found through laboratory studies that zinc can help restore the natural repair functions of immune cells damaged by arsenic and uranium exposures. These findings in turn paved the way for our current pilot clinical trial that tests the hypothesis that supplementing an individual's diet with the USDA Recommended Daily Allowance of zinc (i.e., 11 milligrams) can have a restorative

⁴ Comparison values for metals in blood and urine were obtained from the National Health and Nutrition Evaluation Survey, or NHANES, administered by the Centers for Disease Control and Prevention; see <https://www.cdc.gov/nchs/nhanes/>. Data presented here were compared with the NHANES values reported during the period 2011-2013.

effect – a potential benefit consistent with the notion of restoration embodied in Diné Fundamental Law (NNC, 2002).

30. Health studies conducted since the ENDAUM Petition was filed 10 years ago provide evidence that the existing Navajo population in the Eastern Agency is widely exposed to environmental uranium, metals mixtures in mine wastes, and radionuclides in wastes and drinking water supplies. The evidence so far clearly indicates an increased risk of chronic disease from these exposures, adding to the existing burden of chronic diseases in the Eastern Agency and throughout the Navajo Nation. Given the “worsening CVD risk profile” among the Navajo people (Harmon et al., 2016), approving a method of mining that purposely contaminates the aquifer with a known kidney toxicant, uranium, and potentially with other metals that promote inflammatory responses that may contribute to the already high rates of hypertension and CVD, is not only inimical to the principles of public health, but also presents additional health risks in a population already susceptible to chronic disease.

Conclusions

31. It is my professional opinion that the Westwater Canyon Aquifer should be protected from any human-caused contamination by uranium and other toxic substances because it is critically needed for current and future drinking water supplies in Eastern Navajo Agency.

32. Once uranium is released to the environment, it oxidizes rapidly and becomes highly mobile in aqueous environments. Since oxidation is the principal method by which uranium is removed from its host rock in ISL operations, uranium will always be difficult to restore to premining water quality conditions in deep aquifers like the Westwater Canyon Aquifer. Furthermore, decades of unsuccessful restoration attempts at both commercial-scale

and pilot-scale ISL mines belies the United States's approval of a license for the Crownpoint Uranium Solution Mining Project.

33. Health studies in the Eastern Agency and elsewhere throughout the Navajo Nation have revealed a population having extensive exposures to environmental metals that is already burdened by disproportional rates of chronic diseases. Cardiovascular disease, immune function perturbations and evidence of internal deposition of uranium in babies and mothers are among the adverse health outcomes associated with exposures. Releasing a known nephrotoxicant in the sole source of drinking water in the Eastern Agency will only add to the disease burden attributed to the uranium legacy on the Navajo.

34. For these reasons, it is my professional opinion that the United States should not have approved an operating license for the Crownpoint Uranium Solution Mining Project, and as such, ENDAUM is entitled to the relief requested in its 2011 Petition.

35. This concludes my testimony.

Pursuant 28 U.S.C. §1746, I declare under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Signed on the 18th day of October 2021.

A handwritten signature in black ink, appearing to read "Christopher L. Shuey". The signature is fluid and cursive, with the first name "Christopher" written in a larger, more prominent script than the last name "Shuey".

Christopher L. Shuey, MPH

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Shuey, Christopher L.

eRA COMMONS USER NAME (credential, e.g., agency login): cshuey

POSITION TITLE: Environmental Health Specialist and Director, Uranium Impact Assessment Program

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Ohio University, Athens, OH		1973-1974	Journalism
Arizona State University, Tempe, AZ		1974-1980	Journalism, earth sciences
Colorado School of Mines, Golden, CO	Certificate	1983	Energy Field Institute
Albuquerque Technical Vocational Institute		1986-1988	Mathematics
National Water Well Assn., Columbus, OH	Certificate	1987	Hydrogeology
University of New Mexico, Albuquerque, NM	BUS	1987-1990	Earth sciences, chemistry, Navajo language
Radiation Technical Services, Inc., Houston, TX	Certificate	1993	Naturally occurring radioactive materials in oil and gas industry
University of New Mexico, Albuquerque, NM	MPH	1995-2002	Environmental epidemiology
USEPA, Washington, DC (MARSSIM Working Group)	Certificate	2012	Advanced training in radiological assessments

A. Personal Statement METALS Superfund Research Program, Phase 2

In my tenure as co-lead (and now lead) of the Community Engagement Core of the UNM METALS Superfund Research Center (**P42 ES025589**) since 2014, and throughout my 40 years of working with Native communities, I have observed a slow but steady change in the classic paradigm of researchers creating new science for society, but in a social and cultural vacuum. In the METALS SRP work, we have seen this shift in new and exciting ways as our UNM scientists and faculty have embraced the wisdom of informing research through the lens of community concerns and needs. For example, in response to community concerns about the impact of historic deposition of dusts from the 2,700-acre Jackpile Uranium Mine on local croplands in Laguna Pueblo, the METALS research team has expanded its monitoring of airborne dust in and around local villages to incorporate a community-engaged soil sampling program that will provide answers to whether metal mixtures in gardens and farms present health risks from consumption of locally grown produce. Similarly, over the past two years, my group at SRIC has teamed with researchers at UNM and other universities to respond to requests from the Cameron Chapter of the Navajo Nation for assistance assessing metals and radionuclides in soils and plants on farmlands the community is developing for local and regional commercial crop productions. In both of these Native communities, agricultural is considered an essential activity to address food security concerns, improve health through better diets, and maintain traditional cultural practices.

These experiences have prepared me to lead the METALS CEC in Phase 2. I will not only direct Community Liaisons (CL) at Laguna, Red Water Pond Road Community Association and Blue Gap-Tachee, but will also work with the Cameron Agricultural Ad Hoc Committee to hire a half-time CL there and continue our soil-plant-produce uptake studies with Drs. Brearley and El Hayek in ESE PM. I will work with the UNM biomedical projects staff to coordinate community health surveys and recruitment and consenting of study participants. I will also work with METALS trainees and tribal and federal regulatory stakeholder agencies to conduct workshops in remediation science and policy. And I will be a member of the Indigenous Science Team that will hold semi-annual webinars on cultural practices at play in Superfund remediation programs for the national SRP network.

B. Positions and Honors

Positions and Employment

1974-1978	Staff Reporter, Writer, and Editor, Daily Progress, Scottsdale, AZ
1980-1982	Research Associate, Arizonans for a Better Environment, Tempe, AZ
1980-1983	Freelance Writer, Editor, and Reporter, Correspondent for Time-Life, Inc.
1980-1981	Graphics Artist, The Fonts Typeset and Design, Phoenix, AZ
1981-present	Environmental Health Specialist, director, Uranium Impact Assessment Program, Southwest Research and Information Center; Albuquerque, NM

Selected Consulting Projects

1982-1983	<u>Haralson, Kinerk & Morley, Tucson, AZ:</u> Research on Church Rock uranium tailings dam failure.
1992-1993	Henry, Lowerre and Taylor, Austin, TX: Compiled and summarized regulatory documentation on groundwater issues relevant to DOE's Uranium Mill Tailings Remedial Action Project.
1993-1997	<u>Office of Navajo and Hopi Indian Relocation, Flagstaff, AZ:</u> Assisted in selection, transfer and development of federal lands in northwestern New Mexico for the Navajo Nation.
2000-2001	<u>UNM Community Environmental Health Program:</u> Conducted literature review on uranium toxicity for New Mexico Environment Dept's proposal to lower the state's uranium standard.
2001-2004	<u>Eastern Navajo Health Board, Crownpoint, NM:</u> Designed and implemented environmental health training program for Board members and community leaders.
2003-2007	<u>Church Rock Uranium Monitoring Project, Church Rock Chapter, Navajo Nation:</u> coordinated environmental monitoring of water, land and air in residential areas near abandoned mines.
2009-2010	<u>E2, Inc.;</u> contracted under USEPA TASC program to prepare reviews and analyses of uranium mill tailings wastewater management, groundwater remediation and radon monitoring in and around the Homestake Mining Company mill tailings Superfund site near Milan, NM.
2010-2011	<u>Bluewater Valley Downstream Alliance, Milan, NM:</u> Contracted to Skeo Solutions, Inc., for TASC Program, USEPA Region 6 Superfund Program.
2011-2013	<u>Red Water Pond Road Community Association, Gallup, NM:</u> Contracted to Skeo Solutions, Inc. for TASC work on Northeast Church Rock Mine for USEPA Region 9.
2019-2020	<u>UNM Bureau of Business and Economic Research:</u> Consultation and research supporting BBER's study of the job-generating potential of a uranium mine cleanup program in N.M.

Selected Honors and Professional Recognition:

1994	Bernalillo County (NM) PIPE Award
1995	Karl Souder Memorial Water Protection Award, New Mexico Environmental Law Center
2006	Nuclear-Free Future Award, International Physicians for the Prevention of Nuclear War (shared with SRIC Staff)
2012	Community Recognition Award, Red Water Pond Road Community Association

C. Contributions to Science

1. Journalism Era

In 1978 and 1979, I interviewed dozens of former Navajo uranium miners and the surviving spouses of miners who had already died from lung cancer or non-malignant respiratory diseases. The women's stories of the hardships they faced in caring for their families without their husbands left an indelible impression on me that has lasted a lifetime. I published several articles on the miners and the plight of their widows (e.g., Shuey 1979) and became acquainted with lawyers and public health professionals working to obtain federal compensation for uranium miners. My reporting contributed to broader understanding of the cumulative effects of exposure to radon and to enactment of the Radiation Exposure Compensation Act (RECA) of 1990. As editor of SRIC's quarterly magazine *Mine Talk*, I compiled and documented environmental data on water quality impacts of the 1979 Church Rock uranium mill tailings spill and 20+ years of mine water discharges in the Puerco River Valley in NM and AZ (Shuey, et al., 1982; Shuey, 1986). These findings resulted in publication of a paper documenting extensive groundwater contamination around the United Nuclear Corp. uranium mill tailings impoundment (Shuey and Robinson, 1984). This work eventually led to four major studies of the impacts of uranium mining releases on regional water quality by the U.S. Geological Survey.

- a. Shuey C. Widows of Red Rock. *Saturday Magazine*, Scottsdale Daily Progress; February 1979.

- b. Shuey C, Taylor L, Siskind J. Church Rock Revisited: The Tailings Spill Three Years Later. *Mine Talk*, 2(1-2), Summer/Fall 1982. Albuquerque: Southwest Research and Information Center.
- c. Shuey C. The Puerco River: Where Did the Water Go? Albuquerque: *The Workbook*, Southwest Research and Information Center; March 1986.
- d. Shuey C, Robinson WP. Characterization of Ground Water Quality near A Uranium Mill Tailings Facility And Comparison To Background Levels and New Mexico Standards. New Mexico Bureau of Mines and Mineral Resources (Socorro NM), Hydrologic Report 6, April 1984.

2. Community-engaged Environmental Assessment

I learned early in my career that Native communities are less suspicious about research when they have a direct role in setting the research agenda and participating in the work. In the mid-1980s, for example, families living next to the Animas and San Juan rivers in New Mexico asked SRIC to investigate why water in their private wells had a persistent oily film and petroleum odors. I organized a team of university chemists and Navajo Nation hydrologists to conduct a study of leakage from unlined oil and gas waste pits in the area. Our team found extensive contamination of groundwater by benzene and other hydrocarbons (Eiceman et al., 1986), with the findings eventually leading to a ban on unlined earthen pits for waste disposal.

Concerns among Navajo community leaders that high rates of kidney disease may be linked to uranium contamination of local wells led to UNM-CEHP and SRIC's implementation of the DiNEH Project between 2001 and 2011. A water, land-use and health survey was administered to more than 1,300 residents by our Navajo-speaking staff, who I trained in human subjects research protections, survey administration and water quality science. A little more than 20% of survey participants later volunteered to donate blood and urine samples. Findings from this work demonstrated that proximity and direct contact with uranium wastes were significant predictive factors for chronic disease (Hund et al., 2015; Erdei et al, 2019).

- a. Eiceman GA, McConnon JT, Zaman M, Shuey C, Earp D. Hydrocarbons and aromatic hydrocarbons in groundwater surrounding an earthen waste disposal pit for produced water in the Duncan oil field of New Mexico. *International Journal of Environmental Analytical Chemistry*, 24(2):143-62; 1986. PubMed PMID: 3710677.
- b. Hund L, Bedrick EJ, Miller C, Huerta G, Nez T, Ramone S, Shuey C, Cajero M, Lewis JL. A Bayesian framework for estimating disease risk due to exposure to uranium mine and mill waste on the Navajo Nation. *J. R. Statist. Soc. A*, January 2015. (<http://onlinelibrary.wiley.com/doi/10.1111/rssa.12099/abstract>)
- c. Erdei E, Shuey C, Pacheco B, Cajero M, Lewis J, Rubin RL. Elevated autoimmunity in residents living near abandoned uranium mine sites on the Navajo Nation. *J Autoimmunity* 99 (2019), 15-23.
- d. Blake JM, Avasarala S, Artyushkova K, Ali AMS, Brearley AJ, Shuey C, Robinson WP, Nez C, Bill S, Lewis JL, Hirani C, Lezama Pacheco JS, Cerrato JM. Elevated Concentrations of U and Co-occurring Metals in Abandoned Mine Wastes in a Northeastern Arizona Native American Community. *Environ. Sci. Technol.* 2015, 49, 8506-8514. Available at: <http://pubs.acs.org/doi/pdf/10.1021/acs.est.5b01408>.

3. Church Rock Uranium Monitoring Project

In collaborating with Church Rock Chapter to form the Church Rock Uranium Monitoring Project in 2002, I organized in-kind contributions of radiation detection equipment, laboratory analytical services for water and soil samples, and training of community members in conducting radiation surveys and water and soil sampling. Our assessments identified radiological contamination along highways and next to homes adjacent to mine sites (Shuey and Ronca-Battista, 2007). The results led to EPA issuing enforcement orders requiring removal of contaminated soils around homes next to the Northeast Church Rock Mine in 2007, 2009-10, and 2012. In Blue Gap-Tachee Chapter, I organized a team of community members and SRIC and UNM scientists to collect waste and water samples from on and near the Claim 28 abandoned uranium mine between 2013 and 2016. The results, which were published in the prestigious journal *ES&T* in July 2015 (Blake et al, 2015), led the Navajo Nation to place the site on its list of the top 16 orphan uranium mines for cleanup under a US-Navajo Nation settlement agreement. Our collaboration with Tolani Lake Enterprises and a homeowners association in Sanders resulted (1) in the first public notification that uranium levels in the local public water supply had consistently exceeded the uranium MCL since 2003, and (2) a substantial reduction in risk when the vast majority of residents stopped drinking the tainted water after being connected to a clean public water supply in 2016 (Rock, Shuey and Yazzie, 2015-16). Most recently, I headed a team that worked with Cameron Chapter residents to test soils and plants on two parcels next to the Little Colorado River where they plan on growing local produce and restoring traditional agricultural practices. Our preliminary results indicated that metals and

radionuclides are within “background” ranges on the croplands despite the fact that the land is surrounded by more than 30 AUMs. In this project, we leveraged less than \$25,000 in contract funds to obtain nearly \$100,000 in laboratory services from colleagues at UNM (Center for Water and the Environment) and to give community members trained in the field environmental sampling and report-backs to the communities.

a. Shuey C, Ronca-Battista M. Report of the Church Rock Uranium Monitoring Project 2003-2007. Albuquerque, NM: Southwest Research and Information Center; May 2007. Available at: <http://www.sric.org/uranium/CRUMPRReportSummary.pdf>.

b. Rock T, Shuey C, Yazzie J. Uranium Water Quality Assessment Project. Special Meeting of the Vice President of the Navajo Nation and Stakeholders to Address Uranium Contamination in the Sanders Public Water System; September 25, 2015; revised December 2015, February 2016.

4. Partnerships in Environmental Public Health

My collaboration with UNM-CEHP director Johnnye Lewis began the late-1990s, and thus far has resulted in major contributions to environmental health science. Our exhaustive review of the literature on uranium toxicity and expert testimony before the New Mexico Water Quality Control Commission (Malczewska-Toth et al., 2003) resulted in a nearly threefold reduction in the state's groundwater protection standard for uranium. Findings from the DiNEH Project in 20 Navajo communities linked population exposures to uranium wastes to chronic diseases (Hund et al., 2015). Our current collaboration on the Navajo Birth Cohort Study has resulted in numerous findings, including that Navajo mothers, fathers and babies have much higher concentrations of uranium in their urine than the average US adult, that Navajo mothers are deficient in key nutrients needed to protect immune function, and that such exposures that can lead to adverse reproductive outcomes and developmental delays in Navajo children (Lewis et al., 2015).

- a. Malczewska-Toth B, Myers O, Shuey C, Lewis JL. Recommendations for a Uranium Health-Based Ground Water Standard. Santa Fe, NM: Report to New Mexico Environment Department; May 2003.
- b. Shuey C. Biomarkers of Kidney Injury — Challenges for Uranium Exposure Studies: A Critical Integrative Review of the Literature. Albuquerque: University of New Mexico, MPH Professional Paper; April 2002.
- c. Hund et al., 2015. (Full citation above.)
- d. Lewis J, Gonzales M, Burnette C, Benally M, Seanez P, Shuey C, Nez H, Nez C, Nez S. Environmental Exposures to Metals in Native Communities and Implications for Child Development: Basis for the Navajo Birth Cohort Study. *J Social Work in Disability & Rehabilitation*, 0:1-25, July 2015. (<http://www.tandfonline.com/loi/wswd20>).

Complete List of Published Work in MyBibliography:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1ZqNa89D9pyQy/bibliography/49146505/public/?sort=date&direction=ascending>

D. Additional Information: Research Support and/or Scholastic Performance

Ongoing Research Support

R01ES026673 – NIH/NIEHS Campen (PI) 2016-2021

Inhalation of Contaminated Mine Waste Dusts as a Route for Systemic Metal Toxicity

A strong link exists between metals in airborne PM and adverse cardiovascular and pulmonary outcomes, especially chronic inflammatory vascular disease. Mine wastes at numerous sites in the Southwest US has led to severe soil contamination of metals mixtures, leading to high levels of uranium (U), copper (Cu), vanadium (V), nickel (Ni), and arsenic (As), among others. We will translationally assess direct and indirect atherogenic impacts of inhaled particulate matter obtained from communities with a history of mixed metals contamination. Role: Subaward PI

5P42ES025589-02 – NIH/NIEHS Lewis (PI) 2017-2022

UNM Metal Exposure Toxicity Assessment on Tribal Lands in the Southwest (METALS) Superfund Research Program. The goal of the UNM METALS center is elucidation of how exposures to complex metal mixtures

from uranium mining wastes move in the environment and result in systemic inflammation, exacerbating DNA damage, immune dysregulation, and cardiovascular disease.

Role: Subaward PI; co-lead, Community Engagement Core.

5UG3OD023344-02 - NIH/NIEHS

Lewis (PI)

2016-2023

Understanding Risk Gradients from Environment on Native American Child Health Trajectories: Toxicants, Immunomodulation, Metabolic syndromes, & Metals Exposure (NBCS Phase II-ECHO). The goal of this study, is to assess the impact of environmental metal mixture exposures from abandoned mine waste on birth outcomes and child development. The study will track trajectories of neuro- and physical development of enrolled children until age 8.

Role: Subaward PI.

1656219 – NSF

Cerrato (PI)

2017-2022

CAREER: Understanding the Reactivity of American Native Impacted Uranium Minerals in Mines (URANIUM): Research and Education Outreach. Conducts research on Native American land, including training UNM students in research techniques and activities.

Role: Subaward PI.

General Fund, Southwest Research and Information Center

2010-present

Uranium Impact Assessment Program. SRIC provides technical assistance on uranium legacy impacts to Navajo and other communities. UIAP is also SRIC's vehicle for partnering with communities to assess the public health and water quality impacts of uranium mines. Funding is secured through a combination of general support, foundation grants, donations from individuals, and proceeds from consulting contracts.

Role: Program Director, Environmental Health Specialist.

Completed Research Support

P50 ES026102 -- NIH/NIEHS/NIMHD Lewis/Gonzales Co-PIs

08/01/2015-05/31/2020

Center for Native Environmental Health Equity Research

Research mine-waste exposures in Navajo, Crow, and Sioux communities; mentorship of junior faculty working in partnership with tribes; environmental health training and capacity building in tribal communities. Role: Co-leader, Community Engagement Core.

2UO1 TS000135-04 - CDC

Lewis (PI)

2010-2018

A Prospective Birth Cohort Study Involving Uranium Exposures on the Navajo Nation. CBPR project to develop and follow a cohort of pregnant women and their children to determine the impact of chronic low-level uranium exposures on reproductive and developmental outcomes. Subaward through CDC Cooperative Agreement.

Role: Co-investigator.

June 10, 2005

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

E. Roy Hawken, Presiding Officer
Dr. Richard F. Cole, Special Assistant
Dr. Robin Brett, Special Assistant

In the Matter of:

HYDRO RESOURCES, INC.

PO Box 777

Crownpoint, New Mexico 87313

Docket No. 40-8968-ML

DECLARATION OF MELINDA RONCA-BATTISTA

I, Melinda Ronca Battista, do hereby swear that the following is true to the best of my knowledge. I am qualified and competent to give this declaration, and the factual statements herein are true and correct to the best of my knowledge, information and belief. The opinions expressed herein are based on my best professional judgment.

1. My name is Melinda Ronca-Battista. I am a health physicist and Certified Quality Auditor and research associate with the Institute for Tribal Environmental Professionals ("ITEP") at Northern Arizona University in Flagstaff, Arizona. Since 2002, I have been assigned to ITEP's Tribal Air Monitoring Support ("TAMS") Center, which is physically located at the U.S. Environmental Protection Agency ("USEPA") Radiation and Indoor Environments National Laboratory ("R&IENL") in Las Vegas, Nevada. I reside at 16206 S. 26th St., Phoenix,



Arizona, 85048.

2. I am giving this declaration on behalf of Eastern Navajo Diné Against Uranium Mining ("ENDAUM") and Southwest Research and Information Center ("SRIC") related to the licensing of Hydro Resources, Inc.'s ("HRI's") Crownpoint Uranium Project ("CUP"). Specifically, my testimony in this declaration addresses radioactive air emissions from HRI's proposed Church Rock Section 17 *in situ* leach ("ISL") uranium mine in Church Rock Chapter of the Navajo Nation. This the first time I have testified in this proceeding.

Professional Qualifications

3. My qualifications to make this declaration are described in my résumé, a copy of which is appended hereto as **Exhibit 1**. I have a bachelor of science degree in physics (1981) and a master of science degree in radiological health (1984), both from the University of Michigan. I also have received certification as an auditor from the American Society for Quality. I am a member of the Health Physics Society and the American Society for Quality.

4. Throughout my professional career, I have planned, supervised, conducted and interpreted a wide range of radiation assessments in various environmental media and situations. These include local and national studies of indoor radon, radioactive waste shipments, and contaminated sites. I have developed radiation monitoring devices and protocols for radiation monitoring. I have worked in academia, the private sector and in government with the USEPA's Office of Radiation and Indoor Air in Washington and USEPA's R&IENL in Las Vegas.

5. In my capacity as a research associate with ITEP, I instruct and train Native American professionals in quality assurance/quality control ("QA/QC") procedures and data

analysis, work with tribes to site, calibrate and verify operation of radiological and non-radiological air samplers, and develop analysis procedures and templates. I am assigned to the TAMS Center to work with staff members of both the TAMS Center and USEPA-R&IENL on a wide range of tribal assessment projects. For instance, I have worked with the Bishop Paiute Tribe on issues related to use of areas with potentially high radon concentrations and gamma emitters, with the Taos Pueblo on radioactive materials in air, with the Navajo Nation Superfund Office on survey procedures, quality control techniques and data interpretation, and with tribes all over the continent on air monitoring studies. These include study planning, instrumentation selection, data interpretation, and mitigation options. I have also worked with dozens of tribes in different parts of the country on air monitoring projects, including planning, data assessment, reporting, and interpretation.

6. My experience includes conducting gamma and alpha-emitter surveys of buildings and land. This includes gamma and alpha surveys of land and buildings to be released for public use, such as sites where radioactive sources (including neutron sources) were used, facilities using gaseous radionuclides, radioactive material processing and storage facilities, and open land. I have more than two decades of experience using hand-held radiation survey instruments, as well as laboratory instruments, for the purposes of scoping and final status surveys and the determination of compliance with U.S. Department of Defense, U.S. Nuclear Regulatory Commission (“USNRC” or “NRC”), and USEPA regulations and policies. I have designed studies to evaluate the effectiveness of radiation detection equipment, and conducted dozens of audits of QC procedures and records for users of hand-held gamma-detection instruments, gas proportional counters, liquid scintillation laboratory instruments, and thermoluminescent dosimeters.

7. I am thoroughly knowledgeable in applying the MARSSIM strategy to field radiological assessments, and as indicated in my résumé, I have applied the MARSSIM method in several site applications. The Multi-Agency Radiation Survey and Site Investigation Manual, or “MARSSIM”, was developed over several years by USEPA, the U.S. Department of Energy (“DOE”), the Nuclear Regulatory Commission (“NRC”) and other agencies to provide a nationally consistent, consensus approach to conducting radiation surveys and investigations at possibly contaminated sites, ensuring high levels of QA/QC in conducting surveys, and applying appropriate statistical methodologies to analyze survey data. A copy of the introduction to the manual is attached hereto as **Exhibit 2**. I discuss the purpose and use of the MARSSIM strategy later in this declaration.

8. As part of my duties with ITEP and TAMS Center, in the summer of 2003, I was asked by Church Rock Chapter of the Navajo Nation and the Navajo Nation Environmental Protection Agency (“NNEPA”) to provide radiation assessment training and field services to a collaboration of agencies and organizations conducting environmental monitoring in residential areas of the Church Rock Chapter affected by past uranium mining and milling. Between October 27 and 30, 2003, I assisted the Church Rock Uranium Monitoring Project (“CRUMP”) in conducting gamma radiation assessments along an approximately 10-mile stretch of State Route 566 from Church Rock Village on the south, past the Old Church Rock Mine, which is the site of HRI’s proposed Section 17 ISL mine, past the abandoned United Nuclear Corporation (“UNC”) uranium mill and mill tailings impoundment, and ending on Water Pond Road near the former UNC Northeast Church Rock Mine and the former Kerr-McGee Corporation Church

Rock Mine. A map showing CRUMP study areas and outlining the areas assessed is included as Slide 6 in a CRUMP slide presentation, attached hereto in relevant part as **Exhibit 3**.

9. Working with staff members of the NNEPA Superfund Program, the Navajo Nation Abandoned Mined Lands Reclamation Department (“NNAML”), USEPA’s R&IENL, and SRIC, and employing MARSSIM strategies, I supervised and coordinated gamma radiation surveys conducted by a team of technicians using Ludlum Model 19 hand-held detectors. Photos of team members using these and other detectors are shown in Slides 7 and 8 of **Exhibit 3**. The QA/QC procedures I developed and used and the training I conducted for the surveyors are discussed later in this declaration. I worked with NNEPA-Superfund staff to develop and implement a common and consistent field assessment methodology that was consistent with the MARSSIM strategy and common industry practice for scoping surveys, and accompanied each survey team at least once during the project. I retrieved all data sheets from each surveyor and personally conducted data validation in accordance with pre-determined procedures (daily QC sheet updated and within limits, person received training, location, team, instrument and check source identified, and values legible and consistent between surveyors and instruments.) After verification, I transcribed each data point, and then rechecked 100% of all entries. Finally, I analyzed the data using Excel. In this declaration, I describe the results of these surveys and their implications for the licensing of HRI’s proposed Section 17 mine.

10. Additional gamma radiation assessments for CRUMP were performed by USEPA-R&IENL technicians using the laboratory’s “scanner van.” The scanner van contains two 4” x 4” x 16” sodium-iodide detectors mounted inside a 2.5-ton delivery truck and records gamma rates every second while traveling at about 5 miles per hour along highways and roads.

Photos of the scanner van and its operators are provided in **Exhibit 3**, Slide 8; additional descriptions of the van's capabilities and results of its surveys are discussed later in this declaration. I accompanied the operators of the scanner van on one of the field assessment days in October 2003 and observed the protocols and continuous output. I reviewed the Standard Operating Procedures for the van, spreadsheets of gamma rate data generated by the van as it traveled along paved and unpaved roads in the Church Rock area, and quality control files for the scanner van during this assessment. In this declaration, I describe the results of the scanner van assessments *in the vicinity of and on the Section 17 site* outside of the fenced mine area, how the detectors on board the van were used to statistically characterize the frequency distribution of gamma rates in the different datasets, and the implications of the van's results for licensing of the proposed Section 17 ISL mines.

Licensing Materials and Literature Reviewed

11. In preparing this declaration, I reviewed relevant portions of the following documents and licensing materials. They are listed in chronological order from most recent to oldest:

U.S. Environmental Protection Agency. MARSSIM (Multi-Agency Radiation Survey & Site Investigation Manual), 2002. Available at www.epa.gov/radiation/marssim/.

Partial Initial Decision (Radioactive Air Emissions), USNRC Atomic Safety and Licensing Board, LBP-99-19 (49 NRC 421), May 13, 1999.

ENDAUM'S and SRIC's Response to HRI's and NRC Staff's Answers to LBP-99-15, Questions Concerning Radioactive Air Emissions, April 21, 1999 (hereinafter, "Intervenors April 21st Response").

ENDAUM'S and SRIC's Response to LBP-99-15, Questions Concerning Radioactive Air Emissions, April 7, 1999 (hereinafter, "Intervenors' April 7th Response").

Declaration of Bernd Franke, attached as Exhibit A to Intervenor's April 7th Response, April 6, 1999.

Affidavit of Richard J. Abitz, attached as Exhibit B to Intervenor's April 7th Response, April 7, 1999.

NRC Staff's Response to Intervenor's Presentation on Air Emissions Issues, Feb. 18, 1999 (hereinafter "NRC Staff Response").

Hydro Resources, Inc.'s Response to Eastern Navajo Diné Against Uranium Mining's and Southwest Research and Information Center's January 11, 1999 Brief Regarding Radioactive Air Emissions at the Crownpoint Project, Feb. 11, 1999 (hereinafter "HRI's 1999 Response").

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and U.S. Bureau of Indian Affairs, February 1997. NB 10, ACN 9703200270 (hereinafter, "FEIS").

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Buhl T, Millard J, Baggett D, Trevathan S. Radon and Radon Decay Product Concentrations in New Mexico's Uranium Mining and Milling District. Radiation Protection Bureau, New Mexico Environmental Improvement Division (Santa Fe, NM), March 1985 (hereinafter, "Buhl Study").

In addition to these documents and licensing materials, I have read and reviewed the declaration of Larry J. King (June 2, 2005), a Navajo rancher who resides on Section 17 directly east of the abandoned mining site on which HRI proposes to conduct ISL mining and the declaration of Bernd Franke (June 8, 2005).

Overall Conclusions

12. Based on my knowledge and training in health physics, my experience conducting radiation assessments, and my direct participation in the CRUMP gamma radiation surveys in the Church Rock area, I conclude that gamma radiation rates detected on both sides of State Route 566 and on parts of the King Ranch property directly east of the existing abandoned mining site on Section 17 follow a pattern consistent with anthropogenic causes. Data from hand-held instruments used in the survey clearly show that gamma rates near the road used by mining trucks leaving the Section 17 mine site (called the Old Church Rock Mine) are relatively high and decrease as distance from the road increases. Furthermore, we identified multiple areas on

Section 17 outside of the mine fence having gamma exposure rates as much as 16 times higher than found at the Church Rock Chapter House, about 6 miles south of Section 17, where no mining activities were conducted, but where roads were built and soil disturbed. The only source of material that would cause this statistically significant increase in the average gamma rates on Section 17 outside of the mine site fence and on portions of the King Ranch land is the material from the abandoned uranium mine on Section 17 which has blown, in the form of sand and dust, or been dropped by ore hauling activities near the road.

Expert Analysis

13. In the paragraphs that follow, I explain the methodologies and equipment that my colleagues and I used to conduct the October 2003 radiation assessments in Church Rock Chapter. I summarize the data gathered in those assessments, and compare measured radiation levels on the non-impacted background reference areas with gamma rates observed on and immediately outside of the Section 17 mine site. I also discuss the lack of documentation in the record that to determine if radiation levels on Site 17 have decreased as a result of purported remediation efforts conducted by HRI in 1994.

14. Application of the MARSSIM Strategy. The *full* MARSSIM process was not used in the CRUMP field surveys, but the MARSSIM *methodology* provided a framework for field survey design and implementation, data evaluation and comparison of survey results from different areas in Church Rock. From the MARSSIM Section 1.1:

“MARSSIM provides a nationally consistent consensus approach to conducting radiation surveys and investigations at potentially contaminated sites. This approach should be both scientifically rigorous and flexible enough to be applied to a diversity of site cleanup conditions. MARSSIM’s title includes the term ‘survey’ because it provides information

on planning and conducting surveys, and includes the term 'site investigation' because the process outlined in the manual allows one to begin by investigating any site (*i.e.*, by gathering data or information) that may involve radioactive contamination."

Exhibit 2 at 1-1.

15. The terms "background reference area" and "impacted area" are defined by MARSSIM, and are used in this testimony. MARSSIM defines a background reference area to indicate "areas with similar physical, chemical, geological, radiological, and biological characteristics as the survey unit being evaluated, but where there is an extremely low probability of residual contamination." The MARSSIM defines "impacted" areas as those with a reasonable possibility of containing *residual radioactivity* in excess of natural background or fallout levels," where the term "impacted" refers to areas possibly affected by humans' radioactive-handling activities. During the surveys of the Church Rock area conducted in October 2003, the above definitions were used to classify areas for comparison.

16. "Background radiation" is also defined in the NRC Regulations. See, 10 CFR § 20.1003, cited verbatim in the Intervenor's Phase II Air Brief at 5. In adopting this definition, the Commission said background radiation should include "fallout from past nuclear accidents like Chernobyl, which contribute to background radiation and are not under the control of the licensee." See, 59 Federal Register 43200 (Aug. 22, 1994). "The Commission does not believe it is reasonable for licensees to be required to remediate material over which they have no control and *which is present at comparable levels in the environment both on and off of the site*" (emphasis added). As the results of the CRUMP radiation assessment will show, the differences in radiation levels between mining-impacted parts of Section 17 and "background reference areas" in Church Rock are not comparable.

17. Use of Gamma Radiation Levels as a Detection Tool. Gamma radiation emission rates are routinely used as an environmental and workplace assessment tool in the uranium industry because several decay products of natural uranium (U-238) and thorium and their decay products are strong gamma emitters, and because gamma detection equipment is rugged, fast, easy-to-use, and economical. Radium is a gamma-emitting radionuclide in the uranium and thorium decay series, and the Ra-226 concentration in soils is used as a cleanup standard for lands contaminated by the release of uranium mill tailings. See, e.g., 40 CFR 192.12(a)(1) and (2). Gamma radiation rates measured at one meter from the surface are useful as an indicator of relative concentrations of gamma-emitting material on or near the surface, and are widely used in the radiation assessment field.

18. Hand-held Detector Methods, QA/QC Procedures. The Ludlum-19 detectors used in the CRUMP assessment were loaned by the NNEPA Superfund Program and the USEPA R&IENL. At the start of the October 27-30, 2003 assessment, I verified and documented from calibration certificates and stickers that all of the detectors had had annual calibrations consistent with manufacturers' specifications prior to the field work in Church Rock. Several of the detectors were eliminated from use because they were out of calibration. I conducted an initial half-day training prior to any field measurements, reviewing the required method, documentation, and QC procedures. Every morning each device was checked against an assigned and documented Cs-137 check source to verify that it was operating within control limits, to measure background at the non-impacted background reference site of the Church Rock Chapter House yard, and to review the data gathered. The results of these daily checks were documented on forms designed for this study. I retained custody of all the instruments each evening and re-

verified their stable operation after the day's surveying was complete. A report on the hand-held instruments and QC procedures used for data gathering, transcription and validation is attached to this declaration as **Exhibit 4**.

19. As noted in the QC procedures outlined in **Exhibit 4**, gamma-rate data were checked for internal consistency in two ways. First, the team leader recorded the relative positions of the surveyors at each site. When the data were entered, the surveyors' field data sheets were compared with the positions of each surveyor on the team leader's notes, and data that were inconsistent in terms of location were not used. Second, the internal consistency of results was evaluated. In cases where adjacent results were inconsistent, i.e., when there was more than a 20 microrentgen per hour ("μR/hr") difference between results one meter apart, the data were not used.

20. Scanner Van Operation. USEPA-R&IENL's scanner van contains two 4" x 4" x 16" sodium-iodide detectors. One is mounted inside a collimated shield designed to scan through a window in the shield, and the second is unshielded. Gamma rates measured simultaneously by both detectors are integrated and recorded using a pulse height analyzer; latitude-longitude coordinates are recorded with each gamma measurement by a built-in GPS ("Global Positioning System") locator. Operated by at least two people, the van is capable of recording continuous gamma rates within 200 feet of the vehicle as the van travels at about 5 miles per hour. The scanner van is designed to produce data that show relative increases and decreases in gamma rates, rather than absolute values or gamma energy determinations.

21. Measurement and Analysis of Gamma Rates in Non-Impacted Background Reference Areas. The USEPA scanner van established two sets of "background reference"

gamma levels: (1) At and around the Church Rock Chapter House and in Church Rock Village just north of Interstate 40, and (2) in the Springstead Estates¹ area along State Route 566 about four miles north of Church Rock Village and two miles south of Section 17. See, Exhibit 3, Slide 6 for these locations. The hand-held survey team used these same areas and recorded results for both areas. These areas were chosen for background reference areas because they have similar physical, chemical, radiological, and biological characteristics as those areas on Section 17 outside of the security fence, and in the case of the Chapter House area, have not been affected by past uranium mining activities. The van traveled north on State Route 566, recording gamma rates for both the east and west sides of the highway. The operators set out flags at locations where the measurements were observed to be higher than levels recorded at the background reference locations. At each flag, the hand-held survey team determined a grid area, with points at one-meter intervals, between the road and the security fence or other obstruction, such as wash or cliff. Each hand-held survey at a flagged location was conducted using the standard procedure of walking at a slow pace (about 0.5 meter per second), holding the detector at approximately one meter from the surface and walking along the pre-determined grid line watching the instrument's display for changes in gamma rates, and pausing to record the results every one to two meters on data sheets.

22. Data Compilation and Analyses. After the conclusion of the assessments, I entered gamma-rate data recorded on the surveyors' data sheets into Excel spreadsheets, creating files for each segment of the study area surveyed. I entered comments on each spreadsheet to indicate the surveyors' names, record latitude-longitude coordinates taken by surveyors who had

¹ "Springstead Estates" is the name given to a 1,000-unit planned housing development in Township 16 North,

GPS instruments, and incorporate notes on the physical locations of the surveys. I then used standard statistical analyses techniques available in Excel to record the total number of measurements represented at each location, the mean and standard deviation for the recorded gamma rates, the three highest measurements, and the number of values in the top 10% of each data set. My December 2003 spreadsheets for the sites assessed by hand-held instruments in the immediate vicinity of Section 17 are attached hereto as **Exhibit 5**. Every data point on these spreadsheets includes a hidden comment containing supporting information on instrument serial numbers, surveyor's name, QC check sheet, and dates entered and verified.

23. Gamma-rate data generated by the scanner van and contained in a series of spreadsheets were sent to me by one of the van's operators, Mr. Roger Shura. He also provided QA/QC files for validation of the data. I have reviewed these data and QA/QC files in preparing this declaration. The files are very large due to the sheer magnitude of the data recorded by the scanner van, and I have chosen not to attach them to this declaration. A copy of Mr. Shura's e-mail message transmitting the files to me is attached hereto as **Exhibit 6**, and the data are mapped in **Exhibit 8**.

24. Statistical Analysis of Background Reference Area Gamma Rates. In addition to the statistical analyses of each hand-held data set generated in December 2003, I also conducted analyses of data collected by the scanner van around the Chapter House and Springstead Estates area. The results of those analyses are shown in **Exhibit 7**, which contains a graph of the data set and table of analyses. (I omitted the complete data set itself because it covers more than 10 pages of single-column spreadsheets.) The results show that mean background reference area

Range 16 West, Section 30; it is identified as Study Area C on Slide 6 of **Exhibit 3**.

gamma rates were between 8 and 13 $\mu\text{R/hr}$ (95% confidence interval) at the Church Rock Chapter House and 12 and 15 $\mu\text{R/hr}$ (95% confidence interval) at Springstead. Based on these analyses, there is no statistical difference between the background reference areas' gamma emission rates. Therefore, I determined that background reference area gamma emission rates for the CRUMP study area range up to about 15 $\mu\text{R/hr}$.

25. I also conducted an analysis of the hand-held data collected around Section 17 to determine if there was a pattern shown by the gamma rates measured at various distances from State Route 566. This analysis covered three sets of data: (1) results 8 meters ("m") and closer to State Route 566, (2) results 9 m and farther from State Route 566, and (3) the data gathered from around the Church Rock Chapter House. The distance of 8 m was determined on-site, based on an evaluation of how far material had spread from the road. At points farther than 8 m from the road, the land looked relatively undisturbed and consistent with the soil type and surface morphology and vegetation at further distances.

26. Significant differences among the three data sets emerged from this analysis. First, the shapes of the frequency distributions of the Church Rock Chapter House and the >8 m from the road data sets are relatively normally shaped, with means, modes, and medians approximately the same. The skewness and kurtosis is consistent with normally distributed values, although the >8 m from the road data set shows a trend toward log-normality. The data from within 8 m of the road, however, show a strong trend toward log-normality, with a significant number of results (five percent of the total from this dataset) exceeding the mean plus twice the sample standard deviation. This type of distribution is not consistent with either of the background reference areas (see graph, **Exhibit 7**).

27. Two types of tests of significance between data sets were conducted, one parametric (the student's t-test) and one nonparametric (Wilcoxon Rank Sum test). Both types of evaluations showed significant differences between the means of the populations. The results are shown below in **Table 1**. They show clearly that the gamma rates found along the road are significantly higher than reference background measured either around the Church Rock Chapter House or at the Springstead area.

Table 1. Overview of Differences Between Datasets.

Location	Mean of the gamma scintillometer results, in relative $\mu\text{R/h}$	Confidence Interval (95%) for mean, $\mu\text{R/h}$	Times above Chapter House average background (11 $\mu\text{R/hr}$)
Church Rock Chapter House yard	11	7 – 14	-
Springstead Area	13	9 – 18	No statistically significant difference
Farther than 8 m from 566	23	20 – 25	2
Within 8 m of 566	36	32 – 41	3

28. Mapping the Data. Data generated by the scanner van and hand-held instruments were digitized and co-located on a base topographic map of the Section 17 area by Mr. Jerry Begay, a Geographic Information System technician with the NNEPA Superfund Program. Mr. Begay provided me a file containing a map that resulted from this combining of the two gamma radiation data sources, a copy of which is attached hereto as **Exhibit 8**. Green, yellow and red codes were used to indicate background, twice background, and greater than two times background for both the “Ludlum Data” and the “Scanner Van Data”.² Data from the scanner van are shown in a series of nearly continuous colored dots along State Route 566, a dirt road

² It is important to recognize that the data are to be used for relative purposes only, not for absolute calculations of risk, but to indicate differences between data gathered from various locations.

that goes west from SR 566 on the south side of the Section 17 mine site, along Old Church Rock Mine Road, and on a dirt road that loops through the western part of the King Ranch area.³ (These locations are labeled on the aerial map of the King Ranch and Section 17 mine site, attached as Exhibit 3 to the Larry J. King Declaration.) Data from the hand-held instruments appear as irregular blocks, reflecting the method used by the surveyors who walked the land.

29. Results of the Assessment. Data from the hand-held survey instruments are listed and analyzed as shown in **Exhibit 7**. The analyses show clear overlap between the distributions of the gamma emissions measured at the two reference locations (Church Rock Chapter House and the Springstead area). The distributions from the sites on the west side of SR 566 next to the mine site fence, on the dirt road south of the mine site, and at two locations on the King Ranch property, *inside* Mr. King's fenced grazing area exceeded the means and upper 95% confidence limits of the two background reference areas. Maximum gamma levels at the four sampling locations shown on the spreadsheets in **Exhibit 5** and the number of times they exceed the Chapter House background reference areas level are presented in **Table 2** below.

Table 2. Maximum Gamma Rates at Sampling Locations on Section 17.

Location	Mean at this Survey Unit of the Relative Gamma Exposure Rate (in $\mu\text{R/hr}$)	Maximum Relative Gamma Exposure Rate (in $\mu\text{R/hr}$)	Factor greater than background reference area (Chapter House) mean of 11 $\mu\text{R/hr}$
2-1 and 2-2	21	38	3.5
2-3 and 2-4	28	180	16.4
2-5	35	110	10.0
2-6	34	70	6.4

³ For comparison, please also see Exhibit 3 of Mr. King's Declaration, an aerial map of the same area showing the locations of the Section 17 mine-water ponds, fence line, major roads, and the King homes.

30. Analyses of the Results. Material within Section 17, but outside security fences, emits gamma radiation rates at least 5 times higher than the average at a distance of more than 8 m from State Route 566,⁴ at which distance there was a great reduction in material blown and thrown from road activities. Material within Section 17, but outside security fences, emits gamma radiation 16 times the mean measured on the background reference area of the Church Rock Chapter House (11 $\mu\text{R/h}$). Gamma radiation cannot be “blown by the wind.” As shown on the photo in Slide 15 of **Exhibit 3**, the arid nature of the region, lack of stabilizing vegetation, and high directional winds move surficial material from west to east. This surficial material is from areas covered by the hand-held and scanner van gamma surveys. For Section 17, the nearest receptors are not hypothetical beings that may at some time live just outside of the plant fence, but rather the 13 members of Mr. King’s extended family who live in three homes located about 1,400 feet east and downwind of Section 17.

31. Likely Continued Presence of Residual Radioactive Materials on Site 17. In his January 1999 report in support of ENDAUM’s and SRIC’s Section 8 Air Brief, Bernd Franke reproduced an isocontour map of gamma rates measured by HRI on the Section 17 property in July 1987. See, Intervenor’s Section 8 Air Brief, Exhibit 2 at 21; attached as Exhibit L.2 to Intervenor’s Phase II Air Brief. An inspection of that map shows that gamma radiation rates ranged from 25 $\mu\text{R/hr}$ to 350 $\mu\text{R/hr}$ on the west side of State Route 566 inside the Section 17 mine site restricted area. Background rates outside of the restricted area were shown on the map to range from 10 to 20 $\mu\text{R/hr}$ — a range that on the lower end is consistent with the range of

⁴ The maximum gamma rate, 180 $\mu\text{R/h}$ in survey unit “2-3 and 2-4,” divided by the average of 36 $\mu\text{R/h}$ measured at distances greater than 8 m from 566.

background generated in the CRUMP assessment. Mr. Franke described how the gamma levels inside the mine site were high enough to produce doses to an individual with continuous exposure that would exceed NRC's 10 CFR Part 20 annual dose limit. Id. at 7.

32. In his April 6, 1999, declaration for ENDAUM and SRIC, Mr. Franke attached an August 31, 1994, letter from HRI to the New Mexico Mining Act Reclamation Bureau describing past reclamation activities on Section 17. See, Exhibit 5 of Frank Declaration, attached as Exhibit L to Intervenor's Phase II Air Brief. The letter stated in part, "All sludge has been removed from [five mine-water] ponds" located on the site, and that some areas of the site had been regraded. Id. at 1. HRI's letter did not indicate that the 1987 radiation levels shown in Fig. 2.9-1 of the CRER had been lessened, or provide any data or records to document that confirmatory radiation surveys were conducted to document a reduction in gamma rates.

33. Counsel for Intervenor provided me a copy of all correspondence and reports contained in the New Mexico Mining and Minerals Division ("NMMMD") file for the Church Rock Site 17 mine site. No evidence exists in this file that reclamation activities reduced gamma rates. For instance, there is no indication in these documents that radiation surveys were performed at any time after July 1987 to verify that gamma rates had decreased. It is standard practice to conduct post-remediation surveys to determine and document the success of remediation. Without the results of such surveys, it is impossible to determine if contaminated materials from the previous mining operation have been removed from the site.

34. Apparent Release of Radioactive Materials to Unrestricted Areas. The gamma radiation data collected by the scanner van and by individual surveyors using standard gamma radiation detection instruments and federally recommended surveying techniques clearly show

rates *outside of the Section 17 restricted area fence* to exceed baseline derived from the reference areas of the Church Rock Chapter House and land more than 8 m from State Route 566. The difference was statistically significant. For example, a Student's t-test of the probability that the means of the near-road and off-road data are the same showed a very unlikely probability of $4.23\text{E-}14$. A Student's t-test of the probability that the means of the near-road and Church Rock background reference area are the same showed an even less probability of $3.74\text{E-}37$.

35. The predominant wind directions at the site are from the southwest to the northeast and from the west to the east. There are no other possible sources of technologically enhanced gamma-emitters in the immediate vicinity of Section 17. Thus, I can only conclude that the high radiation levels detected by the CRUMP assessments are from residual radioactive materials dispersed from the Section 17 mine site. Since this site is now licensed by NRC, those residual materials are regulated under the Atomic Energy Act of 1954, as amended. As discussed by Mr. Franke in his 1999 testimonies, radiation from these materials must be included in the calculation of the TEDE for the proposed HRI Section 17 ISL mine because they are not included in the definition of background. Furthermore, the data presented here for Section 17 clearly show that the NRC's background criterion that radiation levels should be comparable on site and off site is not met by material on Section 17, just outside the security fence.

36. Human "Receptors" Live on Section 17. A key difference between the TEDE analysis for Section 8 in Phase I of this proceeding and the TEDE analysis for Section 17 is the fact that there are residents living on Section 17. As Mr. King sets forth clearly in his June 2, 2005, declaration, 13 people live in three homes on the King Ranch property, which is located about 1,400 feet due east of Section 17. Among these individuals are children as young as 7

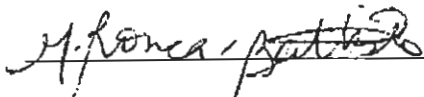
years old. Exposure of these individuals to source material released from the *licensed* Section 17 site must be considered in the TEDE for the project.

37. HRI's License Application for Section 17 is Deficient. I concur with Mr. Franke's conclusion that HRI's license application for Section 17 is incomplete because critical information is missing, and as such, the NRC Staff should never have issued SUA-1508. Franke Declaration, ¶¶ 9-10, 30. As Mr. Franke points out, HRI did not analyze any groundwater sample from Section 17 for dissolved radon to estimate the radon source terms during ISL mining and post-mining restoration. HRI's use of dissolved radon levels from a portion of the Unit 1 site some 20 miles to the northeast of Section 17 to estimate radon source terms at both Section 8 and Section 17 was inappropriate because an accurate estimate of the dissolved radon level in the Section 17 process and restoration streams is crucial to calculating the TEDE. Id., ¶¶ 12-14. Furthermore, no radon-in-air measurements were made by HRI at its Church Rock site since 1987-1988, and those measurements were made at monitors on the eastern boundary of Section 8, not on or at the downwind boundary of Section 17. Id., ¶ 16. Given the absence of new and complete environmental data in HRI's application, it is my professional opinion that the application was incomplete and a license should not have been granted.

38. This concludes my testimony.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Signed on the 10th day of June 2005.


Melinda Ronca-Battista, MS

- 1993-2000 *Sanford Cohen and Associates, Quality Assurance Officer and Research Manager, McLean, VA*
- Conducted 11 on-site audits of radioactive waste shipments from Palo Verde Nuclear Generating Station.
 - Audited radiation safety procedures and on-site activities for military bases nationwide, often as sole auditor.
 - Planned, conducted, and finalized on-site MARSSIM final status surveys of multiple sites, including research facilities such as Boeing Radiation Effects Test Facility.
 - Conducted radiation safety audits for conformance with applicable state and federal requirements of radiopharmaceutical manufacturer.
 - Served as firm's QA Officer on field sampling projects, such as MARSSIM scoping and final status surveys for land where radioactive materials were handled and to be released for unrestricted use.
- 1999-2002 *Consultant to U.S. EPA Las Vegas Radiation and Indoor Environments National Laboratory*
- Designed radon chamber testing for instrument manufacturers.
 - Wrote Quality Assurance Project Plans (QAPPs) for multiple projects, including air, water, vegetation and soil sampling and analysis of the off-site land near the Nevada nuclear weapons test site.
 - Wrote QAPPs for multiple laboratory analysis procedures, chain of custody, and personnel thermoluminescent dosimetry.
- 2002-present *Northern Arizona University, Institute for Tribal Environmental Professionals, Research Associate, Flagstaff, AZ*
- Teaches Indian Country professionals QA/QC concepts, procedures, and data analysis.
 - Works with tribes on location to site, calibrate, and verify operation of samplers of a variety of types and applications.
 - Analyzes data and provides analysis procedures and templates.
 - Lead instructor for classroom and internet courses on QA and data management.

COMMITTEES AND CONTRIBUTIONS

- 2002-present *National Quality Assurance Working Group for the US EPA Office of Air Quality Planning and Standards*, responsible for revising CFR and EPA air monitoring guidance.
- 1994-1996 *Health Physics Society Standards Committee*, various working groups
- 1987 *Contributor, International Workshop on Radon Monitoring in Radioprotection*, Environmental Radioactivity and Earth Science, Trieste, Italy

- 1987 *Speaker, Fourth International Symposium on the Natural Radiation Environment, Lisbon, Portugal*
- 1987 *Participant, Commission of European Communities/US DOE Workshop of Future Research Needs*
- 1988 *Contributor, World Health Organization Monograph on Indoor Air Pollution, Chapter on Radon and Radon Decay Products*
- 1985-2005 *Speaker, multiple conferences, including Health Physics Society annual and midyear meetings, Johns Hopkins Center for Radiation Education, Conference of Radiation Control Program Directors, Certified Engineering Technicians, US DOE technical exchange meetings, EPA conferences, National Tribal Forum, National Tribal Environmental Conferences.*

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PROFESSIONAL AFFILIATIONS

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list of the latest additions to the MARSSIM site

MARSSIM Users

[Frequent Technical Questions](#)

answers to questions commonly asked by MARSSIM users

[Comments](#)

directions for providing comments on MARSSIM

[Training](#)

times and locations of upcoming MARSSIM training sessions

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directions for obtaining a copy of MARSSIM

[Tools](#)

tables and software aids for implementing MARSSIM

MARSSIM Workgroup

[Meetings](#)

location and time of Workgroup meetings; agendas and notes

[About the Workgroup](#)

contact information for Workgroup members

About MARSSIM

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Workgroup is a collaborative effort by the four federal agencies having major radiation protection responsibilities. The group is dedicated to providing technical processes and methods for measuring radioactivity for regulatory compliance that are accepted across federal and state governments.

...protecting people and the environment

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EXHIBIT

2

tables

1 INTRODUCTION

1.1 Purpose and Scope of MARSSIM

Radioactive materials have been produced, processed, used, and stored at thousands of sites throughout the United States. Many of these sites—ranging in size from Federal weapons-production facilities covering hundreds of square kilometers to the nuclear medicine departments of small hospitals—were at one time or are now radioactively contaminated.

The owners and managers of a number of sites would like to determine if these sites are contaminated, clean them up if contaminated, and release them for restricted use or for unrestricted public use. The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Department of Energy (DOE) are responsible for the release of sites following cleanup. These responsibilities apply to facilities under the control of Federal agencies, such as the DOE and Department of Defense (DOD), and to sites licensed by the NRC and its Agreement States. Some States have responsibilities for similar sites under their control.

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides a nationally consistent consensus approach to conducting radiation surveys and investigations at potentially contaminated sites. This approach should be both scientifically rigorous and flexible enough to be applied to a diversity of site cleanup conditions. MARSSIM's title includes the term "survey" because it provides information on planning and conducting surveys, and includes the term "site investigation" because the process outlined in the manual allows one to begin by investigating any site (*i.e.*, by gathering data or information) that may involve radioactive contamination.

The decommissioning that follows remediation will normally require a demonstration to the responsible Federal or State agency that the cleanup effort was successful and that the release criterion (a specific regulatory limit) was met. In MARSSIM, this demonstration is given the name "final status survey." This manual assists site personnel or others in performing or assessing such a demonstration. (Generally, MARSSIM may serve to guide or monitor remediation efforts whether or not a release criterion is applied.)

As illustrated in Figure 1.1, the demonstration of compliance with respect to conducting surveys is comprised of three interrelated parts:

- I. Translate: Translating the cleanup/release criterion (*e.g.*, mSv/y, mrem/y, specific risk) into a corresponding derived contaminant concentration level (*e.g.*, Bq/kg or pCi/g in soil) through the use of environmental pathway modeling.

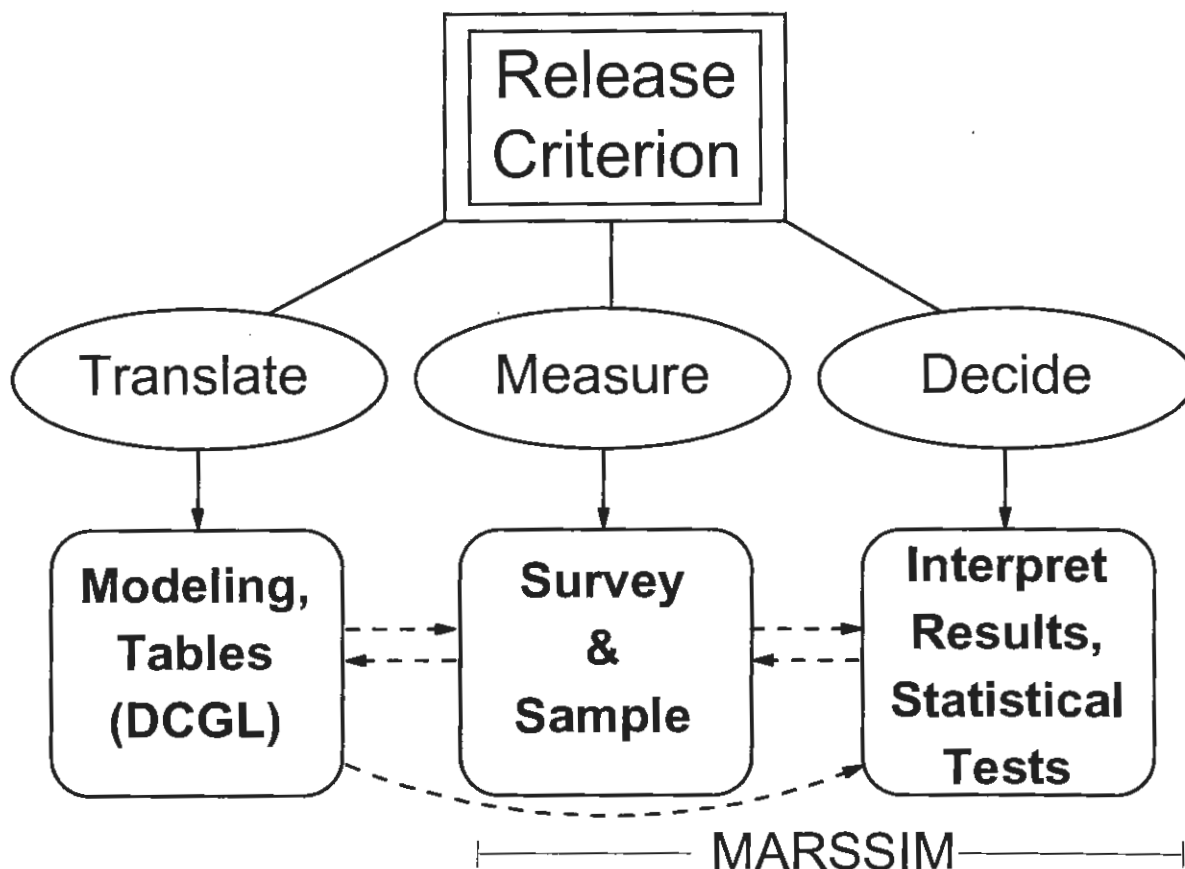


Figure 1.1 Compliance Demonstration

- II. **Measure:** Acquiring scientifically sound and defensible site-specific data on the levels and distribution of residual contamination, as well as levels and distribution of radionuclides present as background, by employing suitable field and/or laboratory measurement techniques.¹
- III. **Decide:** Determining that the data obtained from sampling does support the assertion that the site meets the release criterion, within an acceptable degree of uncertainty, through application of a statistically based decision rule.

¹ Measurements include field and laboratory analyses, however, MARSSIM leaves detailed discussions of laboratory sample analyses to another manual (*i.e.*, a companion document, the Multi-Agency Radiation Laboratory Analytical Protocols (MARLAP) manual that is currently under development).

MARSSIM presents comprehensive guidance—specifically for II and III above—for contaminated soil and buildings. This guidance describes a performance-based approach for demonstrating compliance with a dose- or risk-based regulation. This approach includes processes that identify data quality needs and may reveal limitations that enter into conducting a survey. The data quality needs stated as Data Quality Objectives (DQOs) include performance measures and goals in relation to a specific intended use of the data (EPA 1997a).

DQOs must be developed on a site-specific basis. However, because of the large variability in the types of radiation sites, it is impossible to provide criteria that apply to every situation. As an example, MARSSIM presents a method for planning, implementing, assessing, and making decisions about regulatory compliance at sites with radioactive contaminants in surface soil and on building surfaces. In particular, MARSSIM describes generally acceptable approaches for:

- planning and designing scoping, characterization, remediation-support, and final status surveys for sites with surface soil and building surface contamination
- Historical Site Assessment (HSA)
- QA/QC in data acquisition and analysis
- conducting surveys
- field and laboratory methods and instrumentation, and interfacing with radiation laboratories
- statistical hypothesis testing, and the interpretation of statistical data
- documentation

Thus, MARSSIM provides standardized and consistent approaches for planning, conducting, evaluating, and documenting environmental radiological surveys, with a specific focus on the final status surveys that are carried out to demonstrate compliance with cleanup regulations. These approaches may not meet the DQOs at every site, so other methods may be used to meet site-specific DQOs, as long as an equivalent level of performance can be demonstrated.

Table 1.1, at the end of Chapter 1, summarizes the scope of MARSSIM. Several issues related to releasing sites are beyond the scope of MARSSIM. These include translation of dose or risk standards into radionuclide specific concentrations, or demonstrating compliance with ground water or surface water regulations. MARSSIM can be applied to surveys performed at vicinity properties—those not under government or licensee control—but the decision to apply the MARSSIM at vicinity properties is outside the scope of MARSSIM. Other contaminated media (*e.g.*, sub-surface soil, building materials, ground water) and the release of contaminated components and equipment are also not addressed by MARSSIM. With MARSSIM's main focus on final status surveys, this manual continues a process of following remediation activities that are intended to remove below-surface contaminants. Therefore, some of the reasons for limiting the scope of the guidance to contaminated surface soils and building surfaces include: 1) contamination is limited to these media for many sites following remediation, 2) since many

sites have surface soil and building surface contamination as the leading source of contamination, existing computer models used for calculating the concentrations based on dose or risk generally consider only surface soils or building surfaces as a source term, and 3) MARSSIM was written in support of cleanup rulemaking efforts for which supporting data are mostly limited to contaminated surface soil and building surfaces.

MARSSIM also recognizes that there may be other factors, such as cost or stakeholder concerns, that have an impact on designing surveys. Guidance on how to address these specific concerns is outside the scope of MARSSIM. Unique site-specific cases may arise that require a modified approach beyond what is presently described in MARSSIM. This includes examples such as: 1) the release of sites contaminated with naturally occurring radionuclides in which the concentrations corresponding to the release criteria are close to the variability of the background and 2) sites where a reference background cannot be established. However, the process of planning, implementing, assessing, and making decisions about a site described in MARSSIM is applicable to all sites, even if the examples in this manual do not meet a site's specific objectives.

Of MARSSIM's many topics, the Data Quality Objective (DQO) approach to data acquisition and analysis and the Data Quality Assessment (DQA) for determining that data meet stated objectives are two elements that are a consistent theme throughout the manual. The DQO Process and DQA approach, described in Chapter 2, present a method for building common sense and the scientific method into all aspects of designing and conducting surveys, and making best use of the obtainable information. This becomes a formal framework for systematizing the planning of data acquisition surveys so that the data sought yield the kind of information actually needed for making important decisions—such as whether or not to release a particular site following remediation.

1.2 Structure of the Manual

MARSSIM begins with the overview of the Radiation Survey and Site Investigation Process in Chapter 2—Figures 2.4 through 2.8 are flowcharts that summarize the steps and decisions taken in the process. Chapter 3 provides instructions for performing an Historical Site Assessment (HSA)—a detailed investigation to collect existing information on the site or facility and to develop a conceptual site model. The results of the HSA are used to plan surveys, perform measurements, and collect additional information at the site. Chapter 4 covers issues that arise in all types of surveys. Detailed information on performing specific types of surveys is included in Chapter 5. Guidance on selecting the appropriate instruments and measurement techniques for each type of measurement is in Chapters 6 and 7. Chapter 6 discusses direct measurements and scanning surveys, and Chapter 7 discusses sampling and sample preparation for laboratory measurements. The interpretation of survey results is described in Chapter 8. Chapter 9 provides guidance on data management, quality assurance (QA), and quality control (QC). Information on specific subjects related to radiation site investigation can be found in the appendices.

MARSSIM contains several appendices to provide additional guidance on specific topics. Appendix A presents an example of how to apply the MARSSIM guidance to a specific site. Appendix B describes a simplified procedure for compliance demonstration that may be applicable at certain types of sites. Appendix C summarizes the regulations and requirements associated with radiation surveys and site investigations for each of the agencies involved in the development of MARSSIM. Detailed guidance on the DQO Process is in Appendix D, and Appendix E has guidance on DQA. Appendix F describes the relationships among MARSSIM, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Resource Conservation and Recovery Act (RCRA). Sources of information used during site assessment are listed in Appendix G. Appendix H describes field survey and laboratory analysis equipment that may be used for radiation surveys and site investigations. Appendix I offers tables of statistical data and supporting information for interpreting survey results described in Chapter 8. The derivation of the alpha scanning detection limit calculations used in Chapter 6 is described in Appendix J. Comparison tables for QA documents are in Appendix K. Appendix L lists the regional radiation program managers for each of the agencies participating in the development of MARSSIM. Appendix M lists publications that serve as resources describing sampling methods. Information on data validation is provided in Appendix N.

MARSSIM is presented in a modular format, with each module containing guidance on conducting specific aspects of, or activities related to, the survey process. Followed in order, each module leads to the generation and implementation of a complete survey plan. Although this approach may involve some overlap and redundancy in information, it also allows many users to concentrate only on those portions of the manual that apply to their own particular needs or responsibilities. The procedures within each module are listed in order of performance and options are provided to guide a user past portions of the manual that may not be specifically applicable to the user's area of interest. Where appropriate, checklists condense and summarize major points in the process. The checklists may be used to verify that every suggested step is followed or to flag a condition in which specific documentation should explain why a step was not needed.

Also included in the manual is a section titled Roadmap. The roadmap is designed to be used with MARSSIM as a quick reference for users already familiar with the process of planning and performing radiation surveys. The roadmap gives the user basic guidance, rules of thumb, and references to sections in the manual containing detailed guidance.

MARSSIM, which is based on a graded approach, also contains a simplified procedure (see Appendix B) that many users of radioactive materials may—with the approval of the responsible regulatory agency—be able to employ to demonstrate compliance with the release criterion. Sites that may qualify for simplified release procedures are those in which the radioactive materials used were 1) of relatively short half-life (*e.g.*, $t_{1/2} \leq 120$ days) and have since decayed to insignificant quantities, 2) kept only in small enough quantities so as to be exempted or not

requiring a specific license from a regulatory authority, 3) used or stored only in the form of non-leaking sealed sources, or 4) combinations of the above.

1.3 Use of the Manual

Potential users of this manual are Federal, State, and local government agencies having authority for control of radioactive environmental contamination; their contractors; and other parties, such as organizations with licensed authority to possess and use radioactive materials. The manual is intended for a technical audience having knowledge of radiation health physics and an understanding of statistics as well as experience with the practical applications of radiation protection. An understanding of instrumentation and methodologies and expertise in planning, approving, and implementing surveys of environmental levels of radioactive material is assumed. This manual has been written so that individuals responsible for planning, approving, and implementing radiological surveys will be able to understand and apply the guidance provided here. Certain situations and sites may require consultation with more experienced personnel.

MARSSIM provides guidance for conducting radiation surveys and site investigations. MARSSIM uses the word “should” as a recommendation, that ought not be interpreted as a requirement. The reader need not expect that every recommendation in this manual will be taken literally and applied at every site. Rather, it is expected that the survey planning documentation will address how the guidance will be applied on a site-specific basis.

As previously stated, MARSSIM supports implementation of dose- or risk-based regulations. The translation of the regulatory dose limit to a corresponding concentration level is not addressed in MARSSIM, so the guidance in this manual is applicable to a broad range of regulations, including risk- or concentration-based regulations. The terms dose and dose-based regulation are used throughout the manual, but these terms are not intended to limit the use of the manual.

Note that Federal or State agencies that can approve a demonstration of compliance may support requirements that differ from what is presented in this version of MARSSIM. *It is essential, therefore, that the persons carrying out the surveys, whether they are conducting surveys in accordance with the simplified approach of Appendix B or the full MARSSIM process, remain in close communication with the proper Federal or State authorities throughout the compliance demonstration process.*

1.4 Missions of the Federal Agencies Producing MARSSIM

MARSSIM is the product of a multi-agency workgroup with representatives from EPA, NRC, DOE, and DOD. This section briefly describes the missions of the participating agencies. Regulations and requirements governing site investigations for each of the agencies associated with radiation surveys and site investigations are presented in Appendix C.

1.4.1 Environmental Protection Agency

The mission of the U.S. Environmental Protection Agency (EPA) is to improve and preserve the quality of the environment, on both national and global levels. The EPA's scope of responsibility includes implementing and enforcing environmental laws, setting guidelines, monitoring pollution, performing research, and promoting pollution prevention. EPA Headquarters maintains overall planning, coordination, and control of EPA programs, and EPA's ten regional offices are responsible for executing EPA's programs within the boundaries of each region. EPA also coordinates with, and supports research and development of, pollution control activities carried out by State and local governments.

1.4.2 Nuclear Regulatory Commission

The mission of the U.S. Nuclear Regulatory Commission (NRC) is to ensure adequate protection of public health and safety, the common defense and security, and the environment in the use of certain radioactive materials in the United States. The NRC's scope of responsibility includes regulation of commercial nuclear power reactors; non-power research, test, and training reactors; fuel cycle facilities; medical, academic, and industrial uses of nuclear materials; and the transport, storage, and disposal of nuclear materials and waste. The Energy Reorganization Act of 1974 and the Atomic Energy Act of 1954, as amended, provide the foundation for regulation of the Nation's commercial use of radioactive materials.

1.4.3 Department of Energy

The mission of the Department of Energy (DOE) is to develop and implement a coordinated national energy policy to ensure the availability of adequate energy supplies and to develop new energy sources for domestic and commercial use. In addition, DOE is responsible for the development, construction and testing of nuclear weapons for the U.S. Military. DOE is also responsible for managing the low- and high-level radioactive wastes generated by past nuclear weapons and research programs and for constructing and maintaining a repository for civilian radioactive wastes generated by the commercial nuclear reactors. DOE has the lead in decontaminating facilities and sites previously used in atomic energy programs.

1.4.4 Department of Defense

The global mission of the Department of Defense (DOD) is to provide for the defense of the United States. In doing this, DOD is committed to protecting the environment. Each military service has specific regulations addressing the use of radioactive sources and the development of occupational health programs and radiation protection programs. The documents describing these regulations are used as guidance in developing environmental radiological surveys within DOD and are discussed in Appendix C.

Table 1.1 Scope of MARSSIM

Within Scope of MARSSIM		Beyond Scope of MARSSIM	
<i>Guidance</i>	MARSSIM provides technical guidance on conducting radiation surveys and site investigations.	<i>Regulation</i>	MARSSIM does not set new regulations or non-technical issues (e.g., legal or policy) for site cleanup. Release criterion will be provided rather than calculated using MARSSIM.
<i>Tool Box</i>	MARSSIM can be thought of as an extensive tool box with many components—some within the text of MARSSIM, others by reference.	<i>Tool Box</i>	Many topics are beyond the scope of MARSSIM, for example: -a public participation program -packaging and transportation of wastes for disposal -decontamination and stabilization techniques -training
<i>Measurement</i>	The guidance given in MARSSIM is performance-based and directed towards acquiring site-specific data.	<i>Procedure</i>	The approaches suggested in MARSSIM vary depending on the various site data needs—there are no set procedures for sample collection, measurement techniques, storage and disposal established in MARSSIM.
<i>Modeling</i>	The interface between environmental pathway modeling and MARSSIM is an important survey design consideration addressed in MARSSIM.	<i>Modeling</i>	Environmental pathway modeling and ecological endpoints in modeling are beyond the scope of MARSSIM.

Table 1.1 Scope of MARSSIM (continued)

Within Scope of MARSSIM		Beyond Scope of MARSSIM	
<i>Soil and Buildings</i>	The two main media of interest in MARSSIM are contaminated surface soil and building surfaces.	<i>Other Media</i>	MARSSIM does not cover other media, including construction materials, equipment, subsurface soil, surface or subsurface water, biota, air, sewers, sediments or volumetric contamination.
<i>Final Status Survey</i>	The focus of MARSSIM is on the final status survey as this is the deciding factor in judging if the site meets the release criterion.	<i>Materials or Equipment</i>	MARSSIM does not recommend the use of any specific materials or equipment—there is too much variability in the types of radiation sites—this information will be in other documents.
<i>Radiation</i>	MARSSIM only considers radiation-derived hazards.	<i>Chemicals</i>	MARSSIM does not deal with any hazards posed by chemical contamination.
<i>Remediation Method</i>	MARSSIM assists users in determining when sites are ready for a final status survey and provides guidance on how to determine if remediation was successful.	<i>Remediation Method</i>	MARSSIM does not discuss selection and evaluation of remedial alternatives, public involvement, legal considerations, policy decisions related to planning
<i>DQO Process</i>	MARSSIM presents a systemized approach for designing surveys to collect data needed for making decisions such as whether or not to release a site.	<i>DQO Process</i>	MARSSIM does not provide prescriptive or default values of DQOs.
<i>DQA</i>	MARSSIM provides a set of statistical tests for evaluating data and lists alternate tests that may be applicable at specific sites.	<i>DQA</i>	MARSSIM does not prescribe a statistical test for use at all sites.

Gamma Radiation Monitoring



Carl Holiday, Perry Charley and Evelyn Hood (background) conduct gamma radiation monitoring

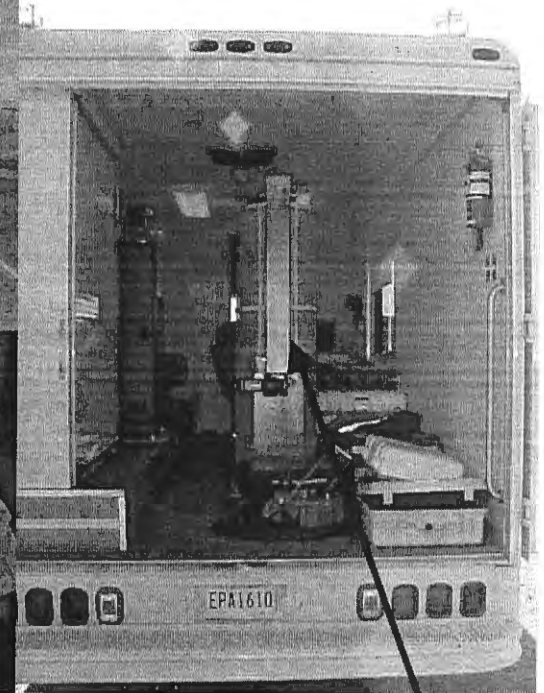
- Surface gamma radiation levels measured with hand-held instruments, USEPA “Scanner Van” in October 2003
- 20+ people from Church Rock Chapter, Navajo Nation, SRIC, TAMS Center, USEPA participated

Gamma Radiation Monitoring (cont'd)

Instrumentation



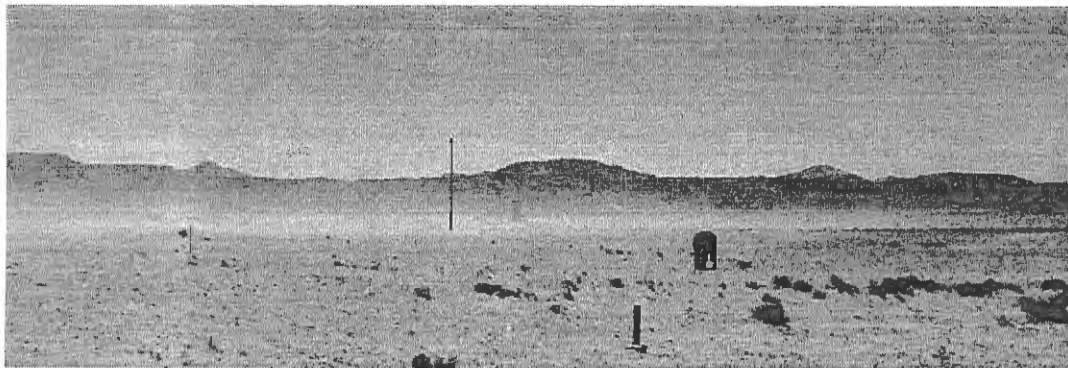
**Hand-held Ludlum-19 detectors
(above) loaned by NNEPA Superfund.**



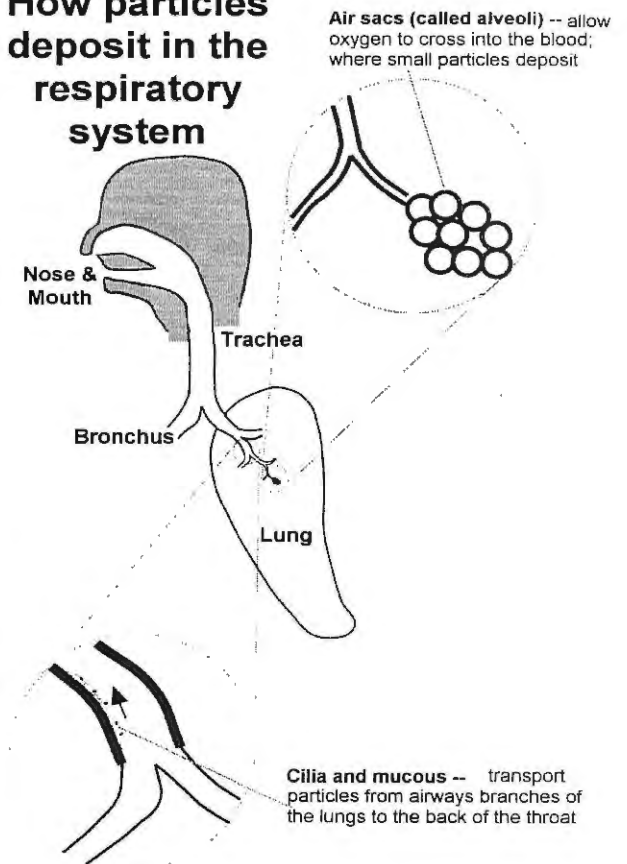
USEPA Las Vegas Lab loaned CRUMP its gamma radiation “Scanner Van” and two technicians for 3+ days. Sodium iodide (NaI) detectors (above right, in cylinder) measure radiation levels within 200’ of van (top middle). On-board computers record and map radiation levels as the van travels at 5 mph. Use of van valued at >\$15,000.

Air Particulate Monitoring

- Tiny dust particles in the air
- Dust irritates lungs, makes breathing problems worse
- Dust may be contaminated with radioactive elements
- People living near uranium mine wastes more likely to be exposed



How particles deposit in the respiratory system



Quality Control/Quality Assurance Procedures¹
CRUMP Gamma Radiation Assessments, 2003-2004
April 2004

Sodium Iodide Ludlum-19 Detectors

The detectors used were 1" X 1" sodium iodide (NaI)Tl crystals inside an aluminum container with an optical glass window that is connected to a photomultiplier tube. A gamma ray that interacts with the crystal produces light that travels out of the crystal and into the photomultiplier tube. There, electrons are produced and multiplied to produce a readily measurable pulse whose magnitude is proportional to the energy the gamma ray incident on the crystal. Electronic filters accept the pulse as a count if certain discrimination height restrictions are met. This translates into a meter response. Sodium iodide survey meters measure gamma radiation in $\mu\text{R/hr}$ or cpm with a minimum sensitivity of around 1-5 μR per hour, or 200-1,000 cpm. The instrument is quite energy sensitive, with the greatest response around 100-120 keV and decreasing with higher and lower energy gammas. The detectors are therefore only useful for detecting gamma emissions from uranium and thorium decay products such as radium, lead and bismuth.

It is important to recognize that these detectors were chosen for the same reason that they are used in a variety of facilities around the country: to provide a relative evaluation of the gamma exposure rate and to identify areas where additional measurements may be needed. This detector type is useful because it is rugged and portable and can be used in situations where relatively low gamma emission rates are expected. Because it responds differently to gammas of different energies, however, it cannot be used as an absolute measure of true gamma emission rate unless it is response-checked against a different device, such as a pressurized ion chamber, in the same environment and gamma energy spectrum where the sodium iodide measurements are to be made.

The procedure used was the typical procedure of walking at about 0.5 meter/sec holding the detector at approximately one meter from the surface and walking along a pre-determined grid line watching the display for changes and pausing to record the results every one meter. To gain additional information about the area, at approximately every three meters the detectors were also held at about one cm from the surface and the result recorded. The results of both measurements can be used as an indicator of the need for further measurements: if the near-contact results are much higher than the one-meter results it can be inferred that the gamma emission is fairly specific in location (e.g., a boulder or small patch of earth), while if the results are similar then it can be inferred that the gammas are being emitted from a wider area, resulting in a more uniform gamma exposure rate field.

¹ This paper was prepared by Melinda Ronca-Battista, a health physicist with the Tribal Air Monitoring Support (TAMS) Center who supervised gamma radiation surveys conducted in Church Rock Chapter in October 2003 by the Church Rock Uranium Monitoring Project (CRUMP).



Quality control procedures

Thorough QC procedures were followed throughout the three-day training project, so that the data gathered can be used as deemed appropriate by the Church Rock community. The purpose of the exercise was to demonstrate a common survey technique used to evaluate areas for the need for further, more specific measurements. Because the QC standards were adhered to, it is possible to use the data to identify areas where small-scale cleanup actions could be conducted.

QC procedures were adhered to and documented during data gathering and data recording. These QC procedures are consistent with industry practice (ref. NRC reg guide) and government recommendations (DOE). Similar procedures are followed during surveys at sites ranging from laboratories, military bases, and site restoration projects.

I. QC during data collection:

(a) Instrument and operator tracking

Operators were assigned detectors at the beginning of the three-day survey and continued to use the same instrument each day. Notation on the instrument check sheets was made of the serial number and operator for each detector.

(b) Instrument calibration

All devices used were within calibration periods. Five instruments were calibrated within the previous month. Calibration due dates are indicated on the daily detector check sheets.

(c) Detector background checks

The Church Rock Chapter house was selected for daily background checks. Background levels were recorded on the detector check sheets prior to making measurements each day.

(d) Detector stability checks

Cs-137 check sources were used every day to verify that the detectors' response was reproducible. Each detector was assigned the same check source to use each day. Jig marks were made on the bottom of the detectors to provide for reproducible results.

(e) Battery checks

Battery level were checked daily. Low batteries were replaced.

II. QC during data transfer

There were three categories of QC used during data recording, transfer, and interpretation.

(a) Data transfer and verification

The transfer of each data point from the field data sheet was checked for accuracy twice. First, when each datum was first entered into the excel spreadsheet each value was double-checked. Second, each data point was verified on a later day (ideally a different person would conduct the verification but in this case only one person was available so the verification was done on a later day to provide some independence). The name and date of the person conducting both the data entry and the data verification is noted on each field data sheet. Data that was questionable in terms of legibility was not used in the final files. Original data sheets with notations for original operator, first transcriber and QC verifier are filed and available.

(b) Operator and detector tracking

Each data point must be associated with the following information to be used in the final report. First, the name of the operator who took the measurement must be known. At the beginning of every grid row or column in the spreadsheet for that survey area the operator is noted in the comment field. This name is associated with a specific detector serial number and stable check source results for that day. In some cases, field data sheets were turned in without names. These results were not used in the report. Second, the operator must have recorded results of their stability checks with the cesium sources on the same day as that survey, and those results must be available and show that the instrument was operating consistently. In the case of one operator, this information was not available and all results from that operator were not used in the final report. In other cases, results from certain days were not used because the instrument check sheet results for that day were not recorded or not available, and these data were also not used.

(c) Internal consistency

Data was checked for internal consistency in two ways. First, the team leader recorded the relative positions of the surveyors at each site. When the data were entered, the surveyors' field data sheets were compared with these positions of each surveyor on the team leader's notes, and data that was inconsistent in terms of location was not used. Second, the internal consistency of results was evaluated. In cases where adjacent results were inconsistent (e.g., more than a 20 microroentgen per hour difference between results one meter away) were not used.

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EXHIBIT

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Date: Thu, 02 Jun 2005 16:20:35 -0700
 From: Shura.Roger@epamail.epa.gov
 Subject: Re: howdy-Churchrock QA files
 To: Melinda Ronca-Battista <melinda.ronca-battista@nau.edu>,
 Chris Shuey <srcic.chris@earthlink.net>
 Cc: Diaz-Marcano.Helly@epamail.epa.gov
 X-Mailer: Lotus Notes 652HF85 November 24, 2004
 X-MIMETrack: Serialize by Router on EPAHUB11/USEPA/US(653HF66|November 02,
 2004) at 06/02/2005 07:20:52 PM
 X-ELNK-AV: 0
 X-NortonAV-TimeoutProtection: 0
 X-NortonAV-TimeoutProtection: 1
 X-NortonAV-TimeoutProtection: 2
 X-NortonAV-TimeoutProtection: 3
 X-NortonAV-TimeoutProtection: 4
 X-NortonAV-TimeoutProtection: 5
 X-NortonAV-TimeoutProtection: 6
 X-NortonAV-TimeoutProtection: 7
 X-NortonAV-TimeoutProtection: 8
 X-NortonAV-TimeoutProtection: 9

Melinda,

This folder contains 22 EXCEL QA files for the Churchrock scan.
 The csv files are the raw data files used with "Realtime Rad". The
 three files that show the system rad source response for 10/28-10/30 are
 xls-Radout06, Radout07 & Radout10. Call and I'll send more stuff later.
 Roger

(See attached file: RadOut01.csv) (See attached file: RadOut01.xls) (See
 attached file: RadOut02.csv) (See attached file: RadOut02.xls) (See
 attached file: RadOut03.csv)(See attached file: RadOut04.csv)(See
 attached file: RadOut04.xls)(See attached file: RadOut05.csv)
 (See attached file: RadOut05.xls)(See attached file: RadOut06.csv)(See
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 attached file: RadOut10.xls)(See attached file: RadOut11.csv)(See
 attached file: RadOut11.xls)(See attached file: RadOut03.xls)

Roger Shura
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 Radiation & Indoor Environments
 National Laboratory
 (702) 784-8235
 FAX (702)784-8231

Melinda
 Ronca-Battista
 Shura/LV/USEPA/US@EPA
 <melinda.ronca-battis
 To: Roger
 cc: Chris Shuey

file://C:\WINDOWS\TEMP\eud21.htm



6/9/05

<srlic.chris@earthlink.net>
ta@nau.edu>

Subject: howdy

06/01/2005 04:15 PM

hi--Thank you for your work on Church Rock. The days the scanner van operated there were

10/28/2003

through

10/30/2003

. Can you send me the QA files for the scanner van measurements for those days? That way I will have all the data with supporting QA in one file.

Do you have the SOPs for the scanner van also? If you send them to me I will get them to Chris Shuey also.
THANK YOU!

Melinda Ronca-Battista
Health Physicist, CQA

16206 South 26th Street
Phoenix, AZ 85048
<http://www4.nau.edu/tams/>

voice 480 759 1544
fax 480 759 5422
cell 602 616 2218



[RadOut01.csv](#)



[RadOut01.xls](#)



[RadOut02.csv](#)



[RadOut02.xls](#)



[RadOut03.csv](#)



[RadOut041.csv](#)



[RadOut04.xls](#)



[RadOut051.csv](#)



[RadOut05.xls](#)



[RadOut061.csv](#)



[RadOut06.xls](#)



[RadOut071.csv](#)



[RadOut07.xls](#)



[RadOut081.csv](#)



[RadOut08.xls](#)



[RadOut09.xls](#)



[RadOut091.csv](#)



[RadOut101.csv](#)



[RadOut10.xls](#)



[RadOut111.csv](#)

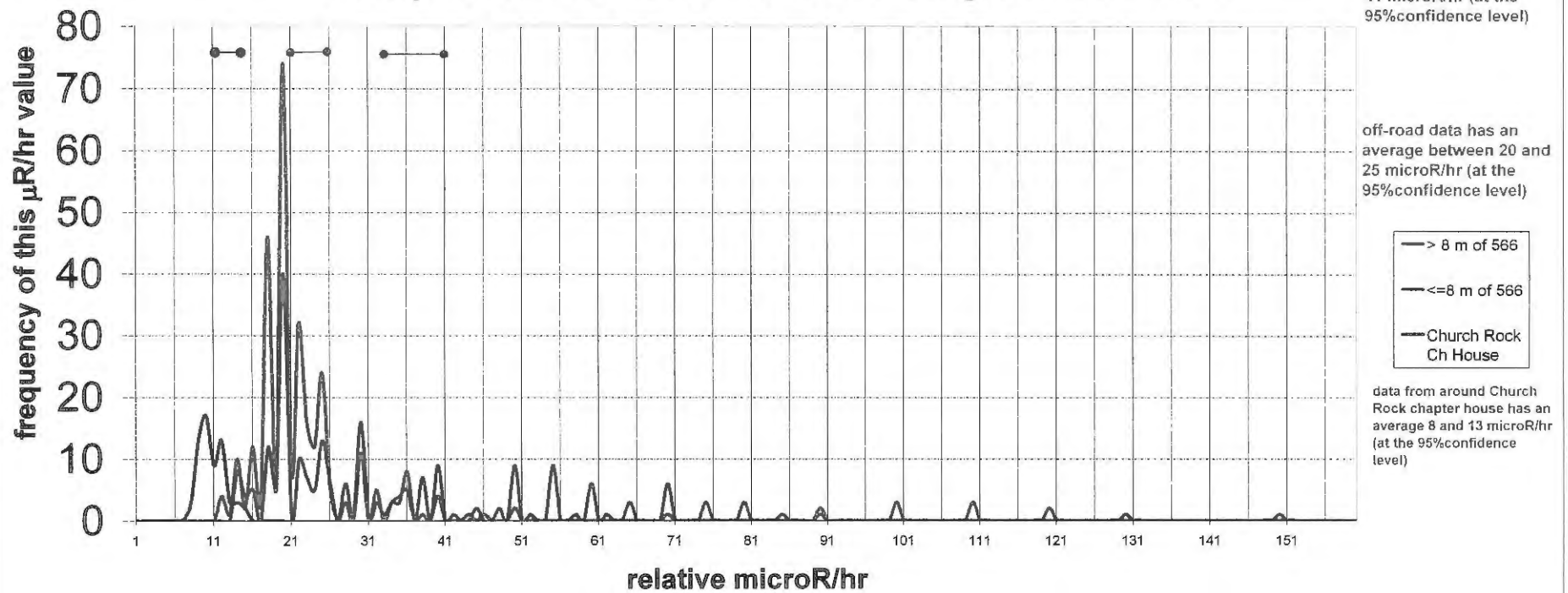


RadOut11.xls

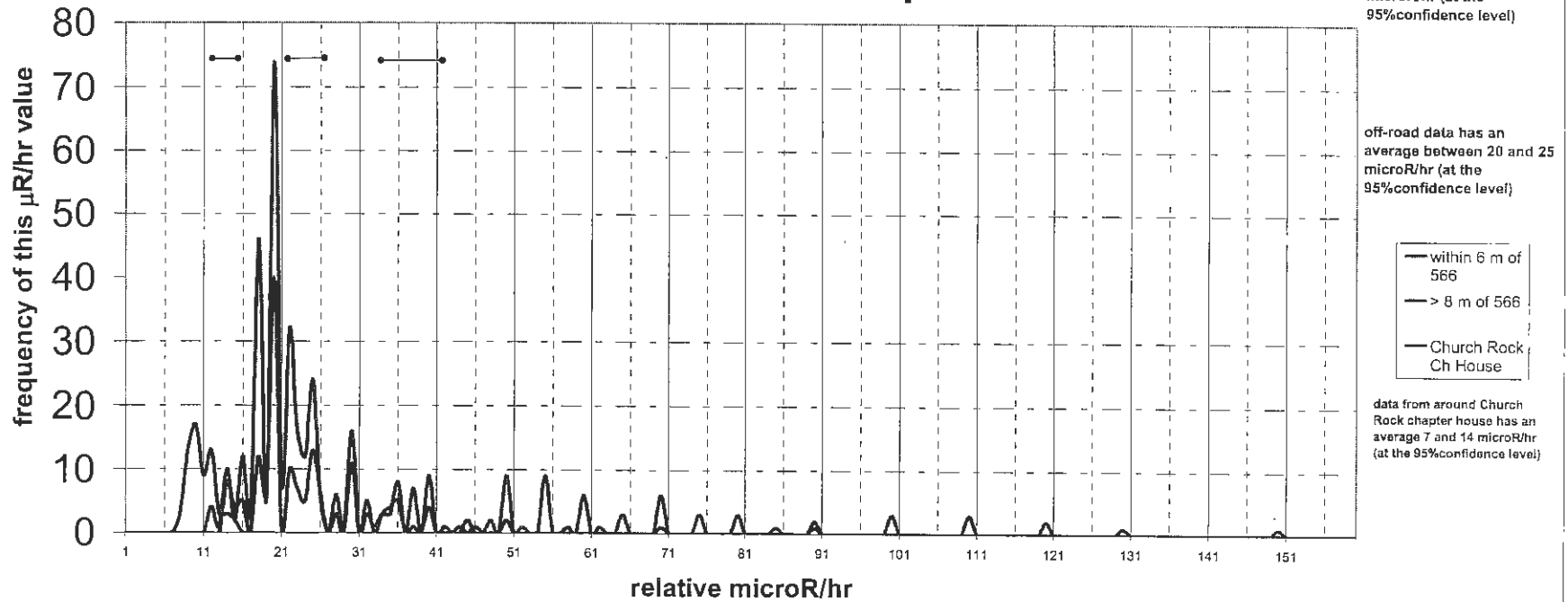


RadOut03.xls

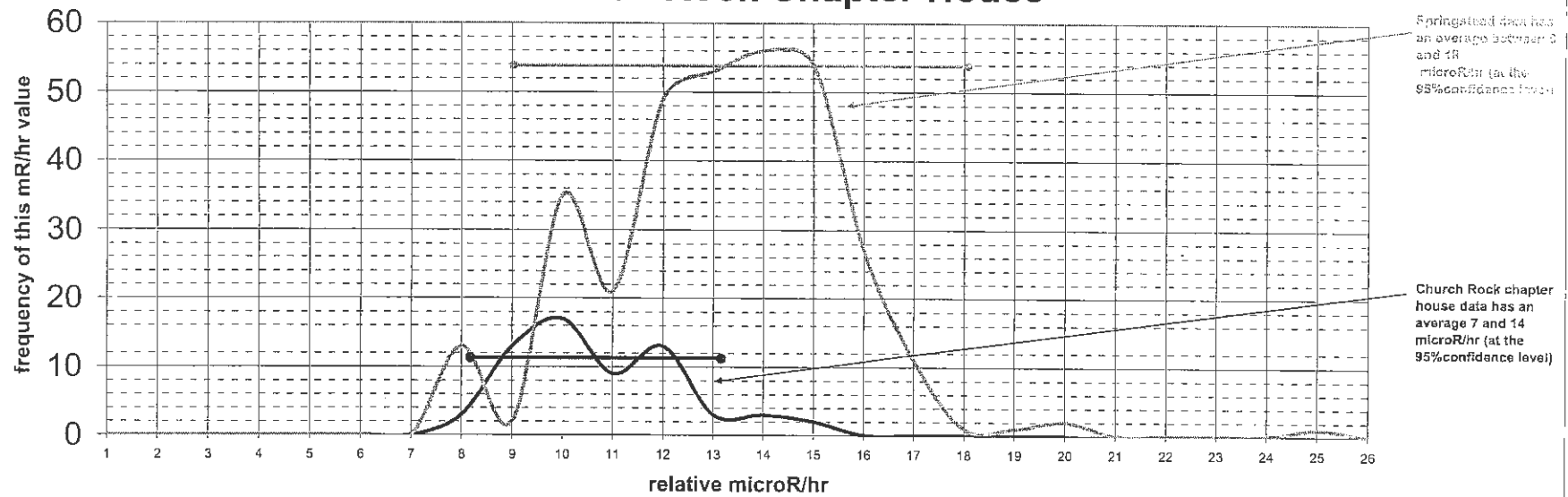
Nal data on Section 17 (≤ 8 m of 566 and >8 m of 566) and Church Rock Chapter House



Nal data on Section 17 (≤ 8 m of 566 and >8 m of 566) and Church Rock Chapter House



Nal data from both background reference areas: Springstead and Church Rock Chapter House



background data from Church Rock Chapter House
data obtained on grassy area surrounding chapter house within rock wall and outside building

day 1	day 2	day 3	mean =	10.746	intervals for histogram	Bin	Frequency
8	11	9			1	1	0
9	12	8			2	2	0
10	13	10			3	3	0
11	14	10			4	4	0
12	15	9			5	5	0
12	14	10			6	6	0
12	15	11			7	7	0
10	14	12			8	8	0
11	13	10			9	9	3
12	12	9			10	10	13
10	10	10			11	11	17
12	11	11			12	12	9
12	12	10			13	13	13
11	9	9			14	14	3
10	10	11			15	15	3
9	9	8			16	16	2
10	13	9			17	17	0
9	12	9			18	18	0
10	10	10			19	19	0
9	12	10			20	20	0
11	12	9					0

histograms

More 0

SPRINGSTEAD DATA:

Bin	Frequency
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	13
9	2
10	35
11	21
12	49
13	53
14	56
15	54
16	27
17	11
18	1
19	1
20	2
21	0
22	0
23	0
24	0
25	1
26	0
More	0

AVERAGE 13.17485

st of N = 18.05647
1.96 * is 4.598579
mean - 8.576268
mean + 17.77343

bkg_ChurchRock

background data from Church Rock Chapter House
data obtained on grassy area surrounding chapter house within rock wall and outside building

day 1	day 2	day 3		
8	11	9	mean =	11
9	12	8		
10	13	10	spl std dev =	2
11	14	10	number of meas=	63
12	15	9	maximum =	15
12	14	10	minimum =	8
12	15	11	second max =	15
10	14	12		
11	13	10	90% percentile =	14
12	12	9		
10	10	10	# of points in top 10%	2
12	11	11		
12	12	10	the 95% confidence interval for	
11	9	9	the mean = the mean plus	
10	10	11	or minus twice $\delta/\text{sq root of } n$, or	
9	9	8	mean is between	7
10	13	9	and	14
9	12	9		
10	10	10	sr of N=	8
9	12	10		
11	12	9	1.96 * is	3
			mean -	7
			mean +	14

intervals for histogram

	Bin	Frequency
1	1	0
3	2	0
4	3	0
5	4	0
6	5	0
7	6	0
8	7	0
9	8	3
10	9	13
11	10	17
12	11	9
13	12	13
14	13	3
15	14	3
16	15	2
17	16	0
18	17	0
19	18	0
20	19	0
	20	0
	More	0

```
mean =      11
median =    10
mode =      10
```

Church Rock Data	Springstead Data	Church Rock Summary Statistics
8	10	<i>Column 1</i>
9	10	
10	10	Mean 10.74603179
11	10	Standard Error 0.212232488
12	10	Median 10
12	10	Mode 10
12	10	Standard Deviation 1.664543145
10	10	Sample Variance 2.837685612
11	11	Kurtosis -0.065968711
12	11	Skewness 0.624046471
10	10	Range 7
12	10	Minimum 8
12	8	Maximum 15
11	8	Sum 677
10	10	Count 63
9	10	Confidence Level(95.0%) 0.424246893
10	10	
9	10	
10	10	
9	10	
11	10	
11	10	
12	11	
13	10	
14	10	
15	10	
14	10	
15	10	
14	10	
13	10	
12	11	
10	10	
11	10	
12	10	
9	10	
10	8	
9	10	
13	12	
12	12	
10	10	
12	8	
12	8	
9	8	

bkg_ChurchRock

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Section 17: 9 m and farther from 566 (beginning at 9 meters from road, in one meter intervals moving away from road)

[illegible]

Sec_17_and_ChurchRockBkg_6-12-05-4.xls

71	70	1
72	71	0
73	72	0
74	73	0
75	74	0
76	75	0
77	76	0
78	77	0
79	78	0
80	79	0
81	80	0
82	81	0
83	82	0
84	83	0
85	84	0
86	85	0
87	86	0
88	87	0
89	88	0
90	89	0
91	90	2
92	91	0
93	92	0
94	93	0
95	94	0
96	95	0
97	96	0
98	97	0
99	98	0
100	99	0
101	100	0
102	101	0
103	102	0
104	103	0
105	104	0
106	105	0
107	106	0
108	107	0
109	108	0
110	109	0
111	110	0
112	111	0
113	112	0
114	113	0
115	114	0
116	115	0
117	116	0
118	117	0
119	118	0
120	119	0
121	120	0
122	121	0
123	122	0
124	123	0
125	124	0
126	125	0
127	126	0
128	127	0
129	128	0
130	129	0
131	130	0
132	131	0
133	132	0
134	133	0
135	134	0
136	135	0
137	136	0
138	137	0
139	138	0
140	139	0
141	140	0
142	141	0
143	142	0
144	143	0

17

More 0

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10
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springlead_data

Springlead data

											intervals for histogram
AVERAGE:	13	10	14	11	15	14	15	11	12	11	1
total number of meas =	326	10	14	13	15	14	15	11	13	16	2
sample standard deviation is		10	14	14	13	13	15	11	13	15	3
	2	10	15	14	12	13	15	10	13	16	4
		10	14	14	13	14	14	11	12	17	5
maximum is	25	10	14	11	20	14	15	11	12	16	6
		10	16	14	20	14	16	11	12	16	7
90th percentile is		10	14	13	16	14	14	11	13	17	8
	17	11	14	16	16	14	16	11	13	14	9
		11	15	13	15	15	15	11	14	15	10
number of data in top 10% is		10	16	13	17	15	15	12	13	15	11
	5	10	14	16	15	15	15	12	13	16	12
		8	17	13	16	14	16	12	13	16	13
		8	13	13	15	14	16	12	13	15	14
		10	15	16	15	14	16	12	13	16	15
the 95% confidence interval for		10	15	14	14	13	15	12	13	12	16
the mean = the mean plus		10	17	13	14	14	15	12	13	15	17
or minus twice s/sq root of n, or		10	16	12	15	13	15	12	13	15	18
mean is between	9	10	16	13	14	15	17	12	13	25	19
and	16	10	17	13	14	15	16	13	13		20
		10	19	12	15	15	16	12	13		21
		10	13	12	15	14	14	12	13		22
		11	14	13	15	15	14	12	14		23
		10	17	11	15	14	15	12	13		24
		10	15		16	15	16	12	12		25
		10	15		16	14	15	12			26
		10	17		16	15	14	12			
		10	15		14	15	13	12			
srt of N =	18.05547	10	14		14	15	13	12			
		10	13		12	17	12	12			
1.96 * is	4.590579	11	14		14	17	12	12			
mean -	9	10	12		13	16	12	12			
mean +	16	10	13		13	16	12				
		10	14		13		14				
		10	14		12		13				
		8	15				11				
		10	14				12				
		12	13				11				
		12	14				12				
		10	14				13				
		8	14				15				
		8	12				13				
		8	12				16				
		8	12				11				
		8	14				12				
		8	14				14				
		8	13				16				
		8					14				
		9					13				
		10					13				
		10					12				
		8									
		8									
		9									
		10									
		13									
		12									
		11									
		13									
		12									

[illegible]

Sec_17_<=8m_from_566



Sec_17_and_ChurchRockBkg_6-12-05-4.xls

Sec_17_<=8m_from_566

45	20
47	30
48	55
49	65
50	75
51	85
52	95
53	105
54	115
55	125
56	135
57	145
58	155
59	165
60	175
61	185
62	195
63	205
64	215
65	225
66	235
67	245
68	255
69	265
70	275
71	285
72	295
73	305
74	315
75	325
76	335
77	345
78	355
79	365
80	375
81	385
82	395
83	405
84	415
85	425
86	435
87	445
88	455
89	465
90	475
91	485
92	495
93	505
94	515
95	525
96	535
97	545
98	555
99	565
100	575

65	3
66	0
67	0
68	0
69	0
70	5
71	0
72	0
73	0
74	0
75	3
76	0
77	0
78	0
79	0
80	3
81	0
82	0
83	0
84	0
85	1
86	0
87	0
88	0
89	0
90	1
91	0
92	0
93	0
94	0
95	0
96	0
97	0
98	0
99	0
100	3
101	0
102	0
103	0
104	0
105	0
106	0
107	0
108	0
109	0
110	3
111	0
112	0
113	0
114	0
115	0
116	0
117	0
118	0
119	0
120	2
121	0
122	0
123	0
124	0
125	0
126	0
127	0
128	0
129	0
130	1
131	0
132	0
133	0
134	0
135	0
136	0
137	0
138	0

Sec_17_and_ChurchRockBkg_6-12-05-4.xls

20
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120
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30
26

139 0
140 0
141 0
142 0
143 0
144 0
145 0
146 0
147 0
148 0
149 0
150 1
151 0
152 0
153 0
154 0
155 0
156 0
157 0
158 0
159 0
160 0
More 1

t-test for the difference between means:

$$t = \frac{\text{mean}_{\text{near-road}} - \text{mean}_{\text{off-road}} - \text{Difference}}{\sqrt{\frac{s_{\text{near-road}}^2}{n_{\text{near-road}}} + \frac{s_{\text{off-road}}^2}{n_{\text{off-road}}}}}$$

ANALYSIS of difference between two sets of data:

	>8 m from 566:	<=8 m from 566:
Mean	22.45559846	36.26495726
Variance	78.23348598	652.9337882
Observations	259	234
Hypothesized Mean	0	
df	283	
t Stat	-7.852852288	
P(T<=t) one-tail	4.2388E-14	UNLIKELY
t Critical one-tail	1.650255747	
P(T<=t) two-tail	8.4776E-14	
t Critical two-tail	1.968381862	

"off-road"	"near-road"
>8 m from 566:	<=8 m from 566:
44	18
25	30
20	55
25	55
20	16
20	15
26	26
19	39
20	14
20	20
29	29
30	20
10	20
26	23
19	29
13	20
16	26
14	26
18	28
12	26
19	40
14	46
19	38
18	24
16	18
18	30
36	55
28	55
23	14
25	14
12	14
14	14
14	14
14	14
12	14
12	14
13	26
14	16
14	20
14	20
14	20
14	20
14	16
20	20
20	20
19	30
20	55
20	65
16	16
20	16
22	20
22	16
20	20
24	16
19	16
20	16
20	22
20	21
20	22
20	23
22	23
26	33
23	28
25	23
20	60
26	50
25	40
25	25
20	20
32	30

[illegible]

road_vs_off_road

46	26
15	25
98	22
25	78
15	65
55	60
20	15
32	29
15	80
10	110
15	27
15	37
16	37
15	45
18	23
16	20
18	40
20	20
42	30
24	74
29	30
36	46
38	55
28	78
25	33
25	46
29	50
25	62
25	60
30	58
35	28
20	85
20	120
17	20
12	33
12	33
16	36
16	36
15	32
14	25
22	23
25	22
22	24
17	70
27	70
22	70
22	80
22	75
30	48
24	48
24	25
24	110
24	100
25	25
25	25
28	36
26	52
35	30
20	30
20	32
24	28
19	25
21	110
18	75
28	40
25	45
13	120
30	100
18	30
29	100
17	130
18	150
18	25
28	80
18	55

road_vs_of_road

26	70
30	55
20	65
20	40
20	50
20	30
18	25
32	25
40	25
35	20
32	20
26	20
35	20
38	20
30	20
30	
31	
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90	
90	
70	
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t-test for the difference between means:

$$t = \frac{\text{mean}_{\text{near-road}} - \text{mean}_{\text{ChapterHouseBkg}} - \text{Difference}}{\sqrt{\frac{s^2_{\text{near-road}}}{n_{\text{near-road}}} + \frac{s^2_{\text{ChapterHouseBkg}}}{n_{\text{ChapterHouseBkg}}}}}$$

ANALYSIS of difference between two sets of data:

t-Test: Two-Sample Assuming Unequal Variances

	<=8 m from 566:	Chapter House data:
Mean	36.26495726	10.74603175
Variance	652.9337882	2.837685612
Observations	234	63
Hypothesized Mean Difference	0	
df	240	
t Stat	15.15508706	
P(T<=t) one-tail	3.74376E-37	UNLIKELY
t Critical one-tail	1.651227393	
P(T<=t) two-tail	7.48753E-37	
t Critical two-tail	1.969897581	

t-Test: Two-Sample Assuming Unequal Variances

	<=8 m from 566:	Chapter House data:
Mean	36.26495726	10.74603175
Variance	652.9337882	2.837685612
Observations	234	63
Hypothesized Mean Difference	0	
df	240	
t Stat	0.308177608	
P(T<=t) one-tail	0.379107247	LIKELY
t Critical one-tail	1.651227393	
P(T<=t) two-tail	0.758214494	
t Critical two-tail	1.969897581	

"near-road"	p4 thru p67
<=8 m from 566:	Chapter House data:
18	8
30	9
55	10
55	11
19	12
15	12
26	12
26	10
15	11
20	12
20	10
20	12
30	12
20	11
20	10
20	9
20	10
20	9
20	10
20	9
46	11
46	11
39	12
34	13
18	14
30	15
55	14
55	15
14	14
14	13
14	12
14	10
14	11
14	12
14	9
14	10
28	9
18	13
20	12
20	10
20	12
10	12
20	9
6	8
10	10
10	10
30	9
55	10
65	11
18	12
18	10
20	9
18	10
20	11
18	10
18	9
16	11
22	8
24	9
22	9
23	10
23	10
23	9
26	
28	
60	
90	
68	
28	
20	

An alternate test is that used by MARSSIM and called the Wilcoxon Rank Sum test.

CR_vs_road

top:

30
55
60
70
80
90
100
110
120
130
140
150
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170
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190
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210
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230
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340
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360
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680
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730
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750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000

CR_vs_road

55
70
55
65
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20
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235

WRS Test CR vs Springsd

Spreadsheet Formulas for the Wilcoxon Rank Sum Test

Can we reject the null hypothesis (that springslead median exceeds that in the church rock chapter house background)
by more than our arbitrary level of 10 microR/hr (church rock ch house mean)?
the W test statistic= 75855

postulated diff= 10 relative microR/hr

DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
8 R		18	323.5	323.5
9 R		19	332.5	332.5
10 R		20	349	349
11 R		21	363	363
12 R		22	374	374
12 R		22	374	374
12 R		22	374	374
10 R		20	349	349
11 R		21	363	363
12 R		22	374	374
10 R		20	349	349
12 R		22	374	374
12 R		22	374	374
11 R		21	363	363
10 R		20	349	349
9 R		19	332.5	332.5
10 R		20	349	349
9 R		19	332.5	332.5
10 R		20	349	349
9 R		19	332.5	332.5
11 R		21	363	363
11 R		21	363	363
12 R		22	374	374
13 R		23	382	382
14 R		24	385	385
15 R		25	388	388
14 R		24	385	385
15 R		25	388	388
14 R		24	385	385
13 R		23	382	382
12 R		22	374	374
10 R		20	349	349
11 R		21	363	363
12 R		22	374	374
9 R		19	332.5	332.5
10 R		20	349	349
9 R		19	332.5	332.5
13 R		23	382	382
12 R		22	374	374
10 R		20	349	349
12 R		22	374	374
9 R		19	332.5	332.5
8 R		18	323.5	323.5
10 R		20	349	349
10 R		20	349	349
9 R		19	332.5	332.5
10 R		20	349	349
11 R		21	363	363
12 R		22	374	374
10 R		20	349	349
9 R		19	332.5	332.5
10 R		20	349	349
11 R		21	363	363
10 R		20	349	349
9 R		19	332.5	332.5
11 R		21	363	363
8 R		18	323.5	323.5
9 R		19	332.5	332.5
9 R		19	332.5	332.5
10 R		20	349	349
10 R		20	349	349
9 R		19	332.5	332.5
10 S		10	33	0
10 S		10	33	0
10 S		10	33	0
10 S		10	33	0
10 S		10	33	0

the critical value is calculated as:

m n

$$test statistic = m(n + m + 1) / 2 + z \sqrt{nm(n + m + 1) / 2}$$

in this case z=1.645

if we want a 90% confidence that the survey unit (springslead)
does not exceed a postulated difference (10 microR/hr)

so m= 63 and n= 326

test statistic= 15577.02

does springslead meet the test statistic?

Is 15577 less than 75855 ?

yes 60278

reject the null hypothesis and conclude with a 90% level of confidence that
the springslead data (limited to data collected) DOES NOT exceed the church rock
chapter house background gamma radiation levels (of energies comparable to what
the instruments used were sensitive to, around 120 keV) by more than 10 microR/hr

WRS Test CR vs Springst

10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
11 S	11	61	0	0	1
11 S	11	61	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
11 S	11	61	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
11 S	11	61	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
8 S	8	7	0	0	1
10 S	10	33	0	0	1
12 S	12	96	0	0	1
12 S	12	96	0	0	1
10 S	10	33	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
9 S	9	14.5	0	0	1
10 S	10	33	0	0	1
10 S	10	33	0	0	1
8 S	8	7	0	0	1
8 S	8	7	0	0	1
9 S	9	14.5	0	0	1
10 S	10	33	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
11 S	11	61	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
16 S	16	297	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	16	297	0	0	1
14 S	14	201.5	0	0	1
17 S	17	316	0	0	1
13 S	13	147	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
17 S	17	316	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1

WRS Test CR vs Springst

17 S	17	316	0	0	1
19 S	19	332.5	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
17 S	17	316	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
17 S	17	316	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
12 S	12	96	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
12 S	12	96	0	0	1
12 S	12	96	0	0	1
12 S	12	96	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
11 S	11	61	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
11 S	11	61	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
16 S	16	297	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
16 S	16	297	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
16 S	16	297	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
12 S	12	96	0	0	1
13 S	13	147	0	0	1
11 S	11	61	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
13 S	13	147	0	0	1
20 S	20	349	0	0	1
20 S	20	349	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
17 S	17	316	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1

WRS Test CR vs Springst

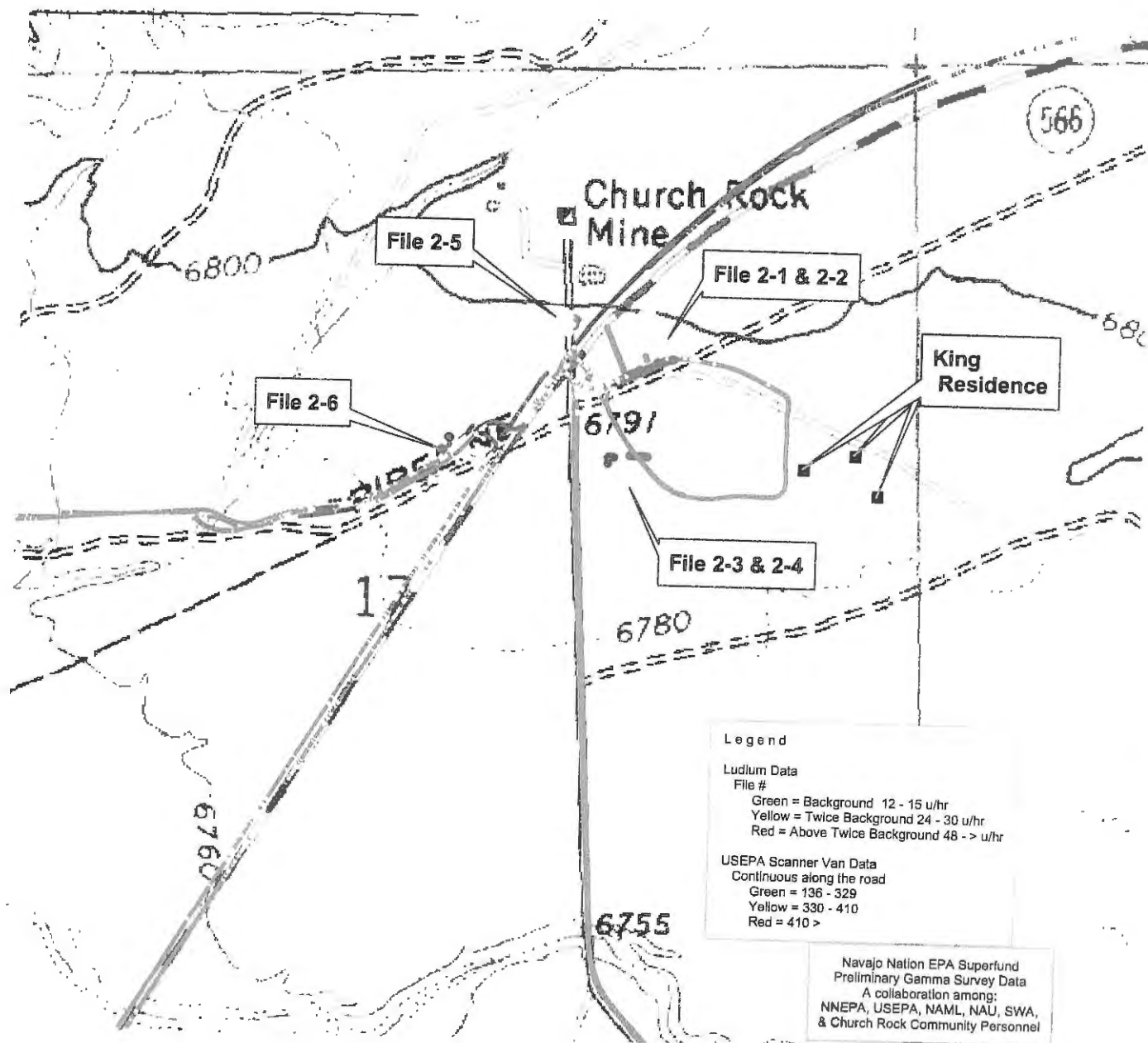
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
12 S	12	96	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
17 S	17	316	0	0	1
17 S	17	316	0	0	1
16 S	16	323.5	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
14 S	14	201.5	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
17 S	17	316	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1

WRS Test CR vs Springst

[illegible]

WRS Test CR vs Springst

13 S	13	147	0	0	1
13 S	13	147	0	0	1
13 S	13	147	0	0	1
14 S	14	201.5	0	0	1
13 S	13	147	0	0	1
12 S	12	96	0	0	1
11 S	11	61	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
17 S	17	316	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
17 S	17	316	0	0	1
14 S	14	201.5	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
16 S	16	297	0	0	1
15 S	15	256.5	0	0	1
16 S	16	297	0	0	1
12 S	12	96	0	0	1
15 S	15	256.5	0	0	1
15 S	15	256.5	0	0	1
25 S	25	398	0	0	1
Sum =			75855	22432	
Check =			75855	63	326



tabbies

8

EXHIBIT

WRITTEN TESTIMONY OF LARRY J. KING

1. Yá'át'ééh shí éí Larry King yínishyé'.

Kin ł ichii'nii nishł́ (Mother's clan: The Red House People clan)

Naanéesht'ezhi 'éí bá shíshchíín (Father's clan: Black streak face clan)

Haltsooi éí dashicheii. (Maternal grandfather: Meadow People clan)

Shinali ei doo shil ba hozhinda (Paternal grandfather: unknown)

2. My name is Larry King.

3. I currently reside in Churchrock, Navajo Nation, New Mexico.

4. My home is located within the planned mining area for HRI/NuFuels' Section 17 site.

5. I have lived in Churchrock my entire life.

6. I am an enrolled member of the Navajo Nation.

Question: Could you describe how and why you became involved with ENDAUM?

7. **Answer:** In the fall of 1996, an individual named Bernadine Martin approached me and told me that an organization called ENDAUM had been trying to get ahold of me for quite a long time, and I had no idea what it was all about. She said they wanted to meet with me. She mentioned something about a proposed uranium mine in Churchrock that would be located near my place.

8. My dad had just passed away. We buried him on Halloween day 1996. So I had moved back to my dad's house, which is where I'm living right now.

9. So I went to a meeting in Crownpoint in January. That's when some of the planned mine was explained to me, and that's when I found out that the Churchrock portion of the mine was right in my backyard. From that day forth I've been involved with ENDAUM.

10. The majority of the meetings were in Crownpoint. I was the only one that lived more than 30 miles away, and so I had to travel to Crownpoint after work, a lot of times, coming home at about 10 o'clock at night.

Q: Was that the first time you had heard about the mine location, or did anyone from the mining company or NRC inform you first?

11. **A:** Nobody from the NRC ever came to me.

12. I do recall someone from the mining company talking to my late father at the County Courthouse in Gallup. I think it was [former HRI Vice President] Mark Pelizza. I had forgotten about this meeting when Bernadine Martin approached me in 1996.

13. He made a presentation on what ISL is about, the ISL mining method.

14. Even though that was the first time I ever heard of that method, right away I said “no.”

Q: Did HRI tell you their mining would contaminate groundwater?

15. **A:** No, no, no. They said, I believe, something like it’s modern technology, it’s a clean method.

16. They just gave me a brief introduction on the method. I told Mr. Pelizza, if you put cream and coffee together with sugar and can separate those items right here, I’ll believe you. But how can you do that? How can you separate the contamination from the underground aquifer? Right off the bat, without knowing anything about ISL mining, I said no, I don’t believe it. That’s all I remember about that meeting, except that I believe it was a short meeting. My dad was there and he didn’t say much. I just walked out.

Q: Where were you living before you moved into your dad’s house?

17. **A:** I was living in a trailer park, just on the north side of the railroad tracks between Churchrock and Gallup. That trailer park is intermingled with city and Churchrock communities, so there were Churchrock community members, registered Chapter voters living in that trailer park, so I was still living in Churchrock community.

Q: Did you grow up on Section 17?

18. **A:** I grew up on Section 16 in Churchrock, which is adjacent to the east side of Section 17. The only reason why we moved a little over half a mile on to Section 17 is because Section 16 is New Mexico state land and Section 17 is tribal trust land.

19. In the beginning, we had no infrastructure. We were able to get our infrastructure over the years. We got electricity in about 1986, even though there was electricity running to the former northeast United Nuclear uranium mine. We didn’t get power until 1986 even though a power line was feeding the the mineshaft over there, and the power line was only about 500 feet away from our house on the north side. There was a huge power line that went up to the mine from the substation on the east side.

20. My sister was the first one that moved here to Section 17. My dad got to move into this current location where I live. They sat in the dark for several years. My dad used to try to approach UNC about getting electricity, because of the power line about 500 feet away from our home.

21. We finally got water when water lines were constructed in 1998. Before that, my family was hauling drinking water for human consumption from a watering point at Rehoboth Mission, near Gallup.

22. That was the main source of their water consumption.

23. But for the livestock there was a windmill on the south, southwest of where we live currently, that was relocated by UNC to a different location.

24. And also, there was a watering point in Gallup, from the city of Gallup, and that's where we hauled water for the livestock; for human consumption was at the Rehoboth mission.

25. We have all the infrastructure now. I got internet service this past December because of the pandemic, so my granddaughter could attend classes online.

Q: Do you know what the well that UNC was using that you used for livestock, your dad used for livestock watering, what it was contaminated with?

26. **A:** Uranium. High radon readings with uranium.

Q: Can you talk about your house is in relation to HRI's proposed Churchrock mine sites?

27. **A:** My residence along with my two sisters' house is probably about 1000 feet to the east from New Mexico state highway 566 and the proposed HRI Section 8 site is on the west side of the highway towards the northwesterly direction. And so the four corners of sections 16, 17 and section 9 and section 8 ... section 8 is HRI is private, and section 9 is tribal trust, is probably just a little over 1000 feet due north from my house.

Q: So you are around 1,000 feet from the mine sites?

28. **A:** Yes. And not to mention the abandoned mine, which is due west of my house, the old UNC mine.

Q: Can you talk about your proximity to abandoned mines in Churchrock?

29. **A:** The mine that we're in very close proximity to, that was the first uranium, as far as I know of, the first underground uranium mine in Churchrock that was sunk back in the 1950s by Phillips Petroleum.

30. So that was in operation for a few years, and then UNC came in and did their exploration drilling and discovered uranium about five miles north of where I'm living at is the, main shaft UNC mine.

31. The UNC mill is about just south of the mine shaft, so that you got that abandoned mill site. Then, less than a quarter mile due north of the UNC mine, there's the Kerr McGee mine, aka Quivira mine.

32. The only reason why those two mines are so close together is because of the Navajo reservation boundary. Kerr McGee did their mining production on reservation lands. UNC said they were on private land on section 36 in the checkerboard area, but it was later discovered through some research by Navajo Nation EPA that it was Tribal Trust land, all along.

33. So there are two abandoned mines and the abandoned mill site about five miles north of where I live, and then another abandoned mine about 1000 feet west of where I live.

Q: What effect has the NRC litigation had on you throughout the years? How has living with the threat of new mining affected your health and your psychological wellbeing?

34. **A:** Well, it's been a while that I've been living with this, since the beginning of 1997, about 24 years. I wonder all the time if HRI is going to come back and then to set up shop directly across from where we live. I also know that my home is on one of HRI's proposed sites; they said that we had to relocate. We're going to be moved out of here because there's a zone around the HRI mine, the project site that no resident should be in.

35. Twenty-four years of living with that in the back of my mind. It's terrible. It's just taking a toll on me.

36. In the earlier years of the 24 years that I've known about HRI, every time I walked out of my house, I used to look in a northwesterly direction of where HRI was proposing their project. I'd look at the natural scenery of how the landscape is and always used to think what's going to happen, how's it going to be next year? How's it going to look a couple years from now, and it's just all that stress.

37. Even as we were going through the lawsuit before the NRC judge, that was another thing that just added a whole lot of stress. I was always wondering how is the NRC judge going to make his decision. We already knew the NRC judge was an industry person, so we knew that the chances of ever getting anything to go our way was almost zero.

38. But we went ahead and we plowed forward. Along the way we made some allies. We did a lot of community education, not to mention educating our elected officials; tribal, federal and state officials. I've heard Churchrock is "Ground Zero" from all the environmental activism, regarding uranium legacy in our community.

39. So, yeah, it was, it was a huge mental and emotional burden on me that I still carry, even though the mine site property has changed hands a few times from HRI to somebody else. I think the last one is Laramide, a Canadian company still holding that piece of paper on ownership of the property. It's still there, it's still lingering.

40. I'm also a former uranium worker. I worked for seven and a half years underground at the UNC site. I have health issues, mainly in the respiratory portion of my health. I have breathing problems. I was diagnosed with high blood pressure and high cholesterol. Most recently, I was diagnosed with a heart condition.

41. I think those 24 years, those should have been the best years, when I could have been enjoying my life. I did not. It's just terrible. It just seemed like I haven't been able to enjoy life at all. I haven't been able to enjoy things that I want to do; enjoy just being here.

Q: You are President of the Churchrock Chapter, correct?

42. **A:** Yes.

Q: Do you have a sense of whether your community is concerned about uranium mining?

43. **A:** I hate to say it, but not as much as they should be. It seems like with the Churchrock community, a lot of the chapter meeting attendees are people that are residing in cluster homes in the immediate community of Churchrock and in the Old Indian Village. It's sort of like a subdivision way of living. Those houses are away from the old uranium contamination. All these uranium issues, they don't have to go through it at all. There are a few people that still remember and are still aware of the threats and who have been exposed to uranium.

44. People should be more concerned about uranium here but they're not. But I remind them. I let them know every chance I get. Even when we're invited to meetings with the city officials of Gallup, I always bring that up to the attendees and the City officials.

45. They should be very outraged and outspoken about the uranium legacy, especially because of the mine water that used to be discharged to the Puerco wash. That mine waste water was flowing freely through the Puerco Wash since the early 1960s, all the way up to the time the mine dewatering pumps were finally shut off; when the mine stopped pumping contaminated mine water to the surface.

46. Many years of contamination flowed into the city of Gallup. The city, as far as I know, never really addressed issues about this contamination flowing, or let their community know about the threat that goes through the wash.

Q: Do you know if anybody ever cleaned up the contamination in the Puerco Wash?

47. **A:** No one ever did. The contamination is still there. The Puerco Wash runs just behind my house. It abuts my grazing area on the east side, about three quarters of a mile away on the east side and about half a mile on the south side.

48. So I'm encircled by contamination from uranium.

49. When the water line to provide drinking water was being constructed on the south side of the Puerco Wash, the water line had to cross the Puerco Wash and when they were digging the trench to lay the pipe at the lowest level of these major washes they had to go about 12 to 14 feet below ground surface. I was there, watching the construction going on. As they were digging down, after they went down several feet, I noticed a smell. It jogged my memory. I thought it smelled familiar. And then I remembered, when all that mine water used to flow freely through the Puerco Wash, when I was younger, I used to play in the Puerco Wash. We used to go walk along the wash or check on the cattle in our grazing area. The wash was right there, so I used to play in that water, not knowing water was coming from the mine.

50. I thought it was part of nature. I didn't know where the water was coming from. But I used to play in there, and the smell that used to come from the mine water in the wash, that

Sulphur smell was coming from this trench the company was trenching out to lay the water pipe.

51. Then, as they kept digging down, I noticed a yellowish stripe on the side of the trench; a yellow color going across a section of the trench. It was the same color and smell that used to come from the mine water in the wash. The yellow stain on that trench was the same slime color that used to accumulate along the Puerco Wash when the mine water was flowing through there.

52. There was another section, about a couple miles upstream, where the water line had to be trenched to cross the Puerco Wash again, to serve some more community members a little further up upstream. I was there also and I observed the same thing that I'd seen when they were trenching in my area; the same smell and the same coloration in the soil.

Q: The Puerco Wash is also where the UNC tailings spill happened?

53. **A:** Yes, July 16, 1979.

Q: You were employed with UNC at the time, correct?

54. **A:** Yes. I was hired at UNC in the fall of 1975. I graduated high school in May of 1975, so I was still a youngster at the time. I was 18 years old when I got employed.

55. The UNC uranium mine may have been the biggest employer in the area at that time. It was good money.

Q: Did you get any warnings about the possibility of exposure to uranium and radiation and how it could affect your health?

56. **A:** No, no warning at all. No education.

Q: Did you work underground?

57. **A:** Yes. At first, I was a laborer for one year on the surface. I was still exposed to all the uranium from the mine, always coming from underground. Then I went underground for the next six and a half years. My job was as an underground surveyor. My job put me right behind the underground miners, in very close proximity with the miners. So, I got the same exposure as the miners did.

58. One day, I don't remember exactly how long before the July 16 spill, my supervisor told me not to go underground. He wanted to take me over to the mill. The mine site and the mill site are separated by a hill, less than a quarter mile apart from each other.

59. We drove over to the mill site, to the southernmost part of the tailings pond. There were a lot of people milling around on the top of the tailings pond dam. That's when I noticed huge cracks going perpendicular across the tailings pond dam. Some of them were wide enough

to put your whole hand down. It was dark, all the way down, so you couldn't see the bottom of the cracks. You couldn't tell how far they went down.

60. My supervisor was talking with other people. I could tell that they were not miners or laborers or anybody that worked in the mine. They were more dressed up, you could tell that they had some authority. They were people that were higher up and so I didn't know who they were. My supervisor talked to these people and then later on he just came back and said "okay, we're going to go back." And we went back to the mine site and I continued with what I was doing.

61. One day a week, every other week, I used to come in early. I would go underground before the day shift got to work at eight o'clock. The miners were paid by the footage, so I used to measure all the advancements that the miners did in their assigned tunnels and measured uranium stockpiles underground. In order to do what I needed to do, I used to go underground two hours before the shift started at eight o'clock.

62. On July 16, 1979, I got to work, didn't notice anything unusual; I just drove straight to work and went underground. It wasn't until the eight o'clock shift got on, and probably about 8:30, when I started running into the daytime employees that I started hearing them talking about, "Did you see the dam? Did you notice the dam?" I didn't know what they were talking about because I was running around underground from tunnels to different places. I did my job and came back to the surface around two o'clock and headed home. I glanced over to the mill site, to the dams. That's when I saw a huge gaping hole in the dam. It was in the same spot that we had visited earlier. It was in the same place where I had seen the cracks.

63. That released over 94 million gallons of mill waste down the Puerco wash. I understand that the mill waste went as far as Winslow [Arizona] and reached the Little Colorado River. But I've always stressed that's not the only time mine waste was released to the Puerco Wash. It's been going on since the early 60s when the shafts were sunk and mine water was starting to be pumped to the surface so laborers and equipment can go underground and do their production. That mine water was being released into all these smaller unnamed washes, eventually joining the Puerco Wash and going through the city of Gallup, going to the community of Sanders, Arizona and probably even into Holbrook Arizona and beyond.

64. That went on 24/7 from the early 60s, all the way up to 1985.

Q: Did anybody ever tell you the mine discharge was dangerous?

65. **A:** Nobody ever did. At the time, I was more focused on my job. I was young, and didn't know there would be repercussions from working in the uranium mine, as far as health is concerned. Nobody ever told us that. Nobody ever said anything about it.

66. I know there are a lot of former coworkers that have passed on because of uranium and cancer issues. I know because I see obituaries in the newspapers over the years. I would also get news from a former coworker who had kept more in touch with a lot of former workers

from UNC. He passed away earlier this year from the pandemic. He used to let me know who had passed on.

67. Throughout the years, he would be at meetings and tours, trying to let federal agencies, state agencies and tribal agencies, trying to address these issues to them, bring it up to their attention. He used to do a lot of presentations and he talked to all these people about what the company did, and all the shortcuts they've been taking as far as the cleanup is concerned. He used to always say the reason why he knew was because he was part of the reclamation crew and he was taught to perform all the shortcuts. But it just seemed like nobody ever really took him seriously.

Q: Can you describe how living near uranium contamination and the threat of a new uranium mine has affected you as a Navajo person?

68. **A:** HRI's proposed mine is northwest of where I live and there's a small canyon there. In the traditional way that I follow, when you say a prayer - it doesn't matter if it's morning, evening or any kind of prayers, a protection prayer... a lot of the things usually mentioned in the prayers are what exist in the area. All the things that are on Mother Earth, the mountains, the trees, the valleys, where the rains go, where the sun comes up. All these mountain peaks where the first sunlight hits in the morning when the sun comes up. And the last tip of the hilltops that the light shines on before the sun goes down. All of these are all mentioned, all the prayers usually mention all these things on Mother Earth. And so a lot of the things that are mentioned in these holy prayers are made up in that small canyon. The echoes. There's a water flow that starts in the canyon.

69. There's a pair of Eagles, too. From several years ago until just recently I've noticed them flying around more often. I always see a pair. Sometimes there's three, maybe a little hatchling that they raised. Everything that is mentioned in our prayers makes up that Canyon.

70. Sometimes I look that way and I think, how's it going to be when HRI, or whoever the next company is when they get through mining? It's just like destroying a church. Any house of prayer from any religion, it's just like destroying that.

71. That's the way I look at that canyon.

Q: Did anybody from the NRC or HRI ever ask you whether the area was important to you culturally?

72. **A:** No, nobody ever did.

Q: If HRI's project goes forward as planned and you get evicted from your land, is that going to affect your cultural practices?

73. **A:** Yes. As a Native, we all live in the same general location generation to generation. I try not to think about being evicted. This is where we're at. This is the only place we know as home. We were brought to this land, to this place, when we were a few days old. And we grew

up here. It always behooves me to think about these people coming from HRI or the NRC and telling us to move. How would they feel if somebody went to their residences and told them, "okay, you have to move because of such and such?" They wouldn't like it.

74. God forbid if it goes that route. I am not moving. I don't care if I have to chain myself to the power pole, this is home and this is where I'm staying. And I am not moving.

Q: If the HRI mine goes forward, will that affect your ability to raise livestock?

75. **A:** It would most definitely affect my work as a rancher because I'm carrying on a tradition that my dad started. He had cattle, all the way back as far as I can remember. I've seen pictures, before I was born, where he had livestock. To lose that tradition, that's going to be devastating.

76. It's another emotional and mental intrusion on me. The HRI project has already affected me a lot, mentally. It will affect me because there will be several acres that are going to be off limits to my cattle. Even if they evict us and move us out, my cattle will still be here. They're going to be exposed to the contamination.

77. Even though the company says that ISL is a modern technology. There's no equipment, there's no human life underground, it's nothing but pumps and pipes.

78. And I've always said those pipes, you're not going to detect a break in the pipe until several days later, weeks later maybe, until that water surfaces to the top. And in between all that time waiting for the telltale sign of a break, how much land would be contaminated? Huge.

79. And it's going to be high grade uranium. I don't know how you would call that, but uranium slurry, going through those pipes.

80. It's going to have a huge effect on my livestock and my tradition of caring for what my dad had left.

81. I plan on continuing that until the very end.

Q: Do you have anything else to add that you'd like the commissioners to hear?

82. **A:** I think what I would like to say to them is I'd like them to listen to the community's concerns.

83. And, listen to our pleas to stop this mining activity from continuing forward. It's a small section. You know, if you look at where the projects are going to be especially for Churchrock. It's a small area back there.

84. We cannot keep going back to uranium mining, we need to look forward and tap into solar, wind power, green energy. Look at how the nuclear chain is affecting our lives, from the mining to the milling, all the way to the nuclear reactors and all the contamination being released into the atmosphere.

85. It's a killer. No ifs, ands, or buts: uranium mining is a killer.

86. I would like to see HRI's license rescinded and respect the Navajo Nation law banning uranium mining on Navajo land. Respect Navajo Nation law and the Treaty that the Navajo Nation government signed with the US government back in 1868.

87. Our job as a grassroots organization, and our allies is not done because then we need to start addressing the abandoned mine that's still sitting right across from where I'm living. That's another huge task.

88. And so, it's a never ending thing, but they need to respect the Navajo Nation law banning uranium mining.

89. And so that way we can live a happy life. Me and my community, deserve a happy life without any lingering in the back of our minds about the possibility of uranium mining. I'd like to enjoy the years that I have left. I've spent 24 years thinking about it.

90. So, yes, respect Navajo Nation law and rescind this license for HRI. Because NRC did not take into consideration the lives of the Navajo Nation, the traditional people out here, that they deserve a happy and healthy life.

91. That's what I've been denied for 24 years. That needs to stop now. For all the people.

I swear or affirm under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge.

A handwritten signature in black ink, appearing to read 'LJ King', written over a horizontal line.

Larry J. King

Date: Oct 18, 2021

WRITTEN TESTIMONY OF CHRISTINE SMITH

1. Yá'át'ééh shí éí Christine Smith yínishyé'.
My name is Christine Smith.
Totsohnii nishłį
Kin ł ichii'nii 'éí bá shíshchíín.
Honágháahnii 'éí dashicheii.
Kiyaa'aanii' éí dashínálí.
2. This is how I identify as a Dine' woman.
3. I'm a resident of Crownpoint, New Mexico.
4. I have lived here since 1969.
5. I'm currently employed with Crownpoint Elementary School as a first grade teacher.
6. Right now I am 65 years old and the oldest in my family.
7. I have four other sisters and four brothers.
8. I have three children. I have my oldest daughter, Lynnea.
9. My middle daughter is Keithlynn Smith.
10. My youngest is my son, Kenneth Smith.

Question: Where were your children born?

11. **Answer:** I had gotten a job in Keyenta Arizona as a school counselor and high school counselor and my daughter, my oldest daughter, was born in Tuba City, Arizona. My oldest daughter, Lynnea, lives just a little north of Becenti Chapter. She and her husband have a ranch out there. They have land out there with horses and cattle. She has two children with the oldest son in high school. The younger daughter's in middle school. They do not have any running water. They have to actually come into Crownpoint, with the big water barrels and haul it back to their well. I think they have a cistern well, which they fill it up, and come back to Crownpoint when they need to fill back up.
12. My middle daughter, Keithlynn, was born here in Crownpoint. She ended up getting a college education. She works at the hospital in the records department. She lives here in Crownpoint with her family. She lives on top of the hill near to the high school.
13. The youngest was also born here in Crownpoint. He is a firefighter, who works with Gallup Fire Department. Because of his employment, he lives in Gallup and he'll commute back to Crownpoint every now and then to visit and stay with me for a while.

Q: Could you describe where you live?

14. **A:** I live with my brother, we have a small trailer. It's a two bedroom trailer. It originally belonged to my father. And so, I live with my younger brother and his name is Patrick Sandoval. He's unemployed right now so I am the main income earner in the family. My husband has been deceased since 2014.

Q: How close are you to the HRI processing plant?

15. **A:** I live on this section right near the HRI property. I can see the processing plant from my home. I would say the fence line is about 400 – 500 feet from my home. It's that close - I can see it from here.

16. I go to the St. Paul's Catholic Church which is located on top of the hill over the HRI property. I can stand on top of the hill and see right down below the hill and HRI is located there at the bottom of the hill.

Q: Does living so close to the HRI plant concern you?

17. **A:** Right now, there's nobody at the HRI plant. At the time when HRI was courting the allottees, I had this fear that it was going to start back up. I didn't know what was going to happen, and I was fearful that living so close to the facility might affect me and my family at that time, when there was a lot of activity at the HRI property. I had other family members – some of my brothers and sisters - living here at the time, but they slowly moved out. I was fearful about it affecting their health. I didn't want them to end up with cancer or other types of harm that might come from living so close to the uranium mine or the processing plant.

Q: Would you be worried if HRI started mining again and processing uranium?

18. **A:** I certainly would, mainly because trucks would be traveling right next to my trailer to the north, and then they will be traveling also down the main road that's right in front of my home. They would be hauling all types of chemicals and radioactive materials, I would be very fearful of that.

19. Right now, we don't have very much housing on the reservation. And so, it would be hard for me to get a home. There are no homes to buy here. There's really no place for me to go. I wouldn't have the option of picking up everything and moving somewhere else. I would have to apply for a home site lease and that would take time. It's a big process that you have to go through, just to find a place to live, especially you're not originally from here. If you're a family member to somebody that's been here for a long time, it's a little bit easier. But when you come from another place it's more difficult.

20. I would be afraid because I'm going back to our medical history. My brother Patrick, I mentioned that I live with him and he's my younger brother. He ended up getting a tumor on his kidney, which was cancerous. They had to remove his kidney. Now he lives with one kidney,

he has diabetes and high blood pressure. It's really hard for him to find employment right now. He would be one person that I would worry about if the processing plant started up again.

21. As for myself, I did end up getting stomach cancer in 2014. I was very fortunate to have gone to the hospital at the right time. They had done a biopsy, and they found out that I was in the beginning stages of cancer. I was able, with the help of my children knowing the medical system, to get a doctor's immediate care from Albuquerque. I ended up going through surgery and they removed a third of my stomach. Those are some of those things that that worry me.

22. I'm just afraid that other things might happen. Today, I still have my children come down to visit me. I also have my grandchildren that come to visit me, and I don't want them to be in an area where it's going to harm them directly.

23. If mining starts, I worry about the water that's being hauled out to my daughter's house. I worry about my children and family members living here in Crownpoint and having to use the water supply that could be contaminated.

24. My biggest fear is for my grandchildren. I want them to have clean running water. I want them to have all the benefits that I enjoyed when I was small; clean air, the ability to go into nature and enjoy it.

Q: Does the possibility of accidents, such as truck accidents, leaks, spills or explosions from the processing plant concern you?

25. **A:** That would be my biggest fear that those things could happen, an accident or explosions. There are no guarantees; I don't care how much uranium companies say that it's going to be safe, there are always things that are going to happen.

26. So that's my biggest fear, especially on my road here, for the people that live here. We have four different churches that go up and down the road here. We have people that live across the road. So those individuals that we've come to know, I would hate for them to be affected by any accident that should happen.

Q: Wouldn't the local fire department or hazardous materials team take care of any accident?

27. **A:** No, there would be nobody. Right now, the fire department is a volunteer fire department. My son used to work with the volunteer fire department, so I know their training is very limited, very minimal. This is mainly because of the limited funding that the county fire system has to train them. When my son was with the volunteer fire department, he did go to trainings, but that was very limited and it wasn't to handle or clean up hazardous or radioactive materials. It would take time for professional help to come out to Crownpoint to deal with these accidents.

28. The medical staff in Crownpoint are also facing a financial crunch. It seems that we are seeing nurse practitioners more than doctors these days. So, I would feel more confident if a doctor were here to be on call all the time, if an accident happened.

29. Now, when somebody needs care from the hospital, they need to be flown out to a different hospital. They have to go to a different hospital to get tested. They have to go to a professional just to get a diagnosis. They can only do so much here at Crownpoint Medical Center. They would not be equipped, from what I've seen from when I've visited the hospital, to handle any type of hazardous or radioactive accident.

Q: When your son was with the volunteer fire department, did he receive training about how to handle radioactive materials or respond to accidents involving radioactive materials?

30. **A:** He never received any of those. He received information about the effects of uranium, but no training on handling or clean up. Most of his trainings were mainly about how to extricate people in vehicle accidents and what to do upon arrival at the scene. I know that when he moved to Gallup, he received training on responding to hazardous materials accidents because he was under the Gallup Fire Department.

Q: How far is Gallup from Crownpoint?

31. **A:** About 61 or 62 miles.

Q: When HRI was applying for its license, did anyone from the mining company ask you how you felt about the processing plant locating so close to your home?

32. **A:** I've never received anything from them. Nobody came to see me. Nothing!

33. I knew that it was happening, but I was so busy trying to survive as a single mother, trying to take care of my children. What caught my eye was when we saw in the paper that money was going to be given to uranium mining companies. I believe [former Congress member] Heather Wilson was at that time trying to get funding to give to the uranium corporations to start up the uranium project. That worried me and that worried my daughter Lynnea.

34. My daughter Lynnea was in high school at the time, and I would have to credit her for making me go to the meetings. She'd say "Mom, let's go, let's go to the meetings." That's when we started getting involved with Eastern Navajo Diné Against Uranium Mining. But before then, I think I was so busy in life trying to take care of my children and trying to find a job. At that time I was struggling to make money for my children and finally got a foot in the door of education and I started going back to school to get my teaching license.

35. My daughter is the one that I credit to get me to go and find out what's going on and to get involved and to also educate ourselves about what's going on.

Q: Did anybody from the Nuclear Regulatory Commission or the U.S. government come to talk to you about the proposed uranium mine?

36. **A:** They did not come to see me, they didn't come to my house and they didn't talk to anybody in my family.

Q: If mining were to begin, how would that affect you personally, both emotionally and as a Diné person?

37. A: This has been hard for me as a Native person. I always felt that we got the bad end of the stick. I see it through education. I see it through the economics. I see it through the border towns. And I see it through this uranium mining.

38. We've always been put last. I think about how Our People were once proud People, how we were a strong People.


39. I feel that I lost my identity as a Navajo at one time. But recently, through my children, we have come to learn who we are as Diné. I have a clan, my clan makes me strong. The elements - the fire, the Earth, the water and the air, are all important elements that are part of who we are as Diné. All our songs and prayers are based on those four elements. I think that if the water was contaminated it would destroy one of the elements of who we are as a Native people.

40. Recently, I've been involved in ceremonies and listening to the songs, the beautiful songs and prayers. To sing to the holy people, the deities, that take care of us every day it's a part of me, and to destroy the water, the air, the earth is destroying a part of ourselves, it's destroying my family structure, and it's destroying my community.

41. It's not only me, it's my students that I teach. My little first graders. I talk to them sometimes about the water, respecting the water, and not to waste the water; that the water is a part of them and that they should keep it sacred. I relate to them as their mother, their grandmother, and I try to teach them about the sacred elements.

42. To me, it would be a big loss if mining started again. I will try everything I can to keep that from happening. I also really think about my grandchildren too. They are not able to enjoy the benefits of what I saw when I was small. So, I want to preserve what we have left for my family, my children and my grandchildren.

I declare, under penalty of perjury, that the foregoing testimony is true and correct to the best of my knowledge.



Christine Smith

Date: 10-01-21

NAVAJO NATION

JONATHAN NEZ
PRESIDENT

CROWNPOINT CHAPTER
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MYRON LIZER
VICE PRESIDENT

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Rita Capitan, President

Leonard Perry, Vice President

Helen Murphy, Secretary/Treasurer

Mark Freeland, Council Delegate

Herbert Enrico, Land Board Member

RESOLUTION CPC: 21-08-06

SUPPORTING EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S ALLEGATIONS OF HUMAN RIGHTS VIOLATIONS AGAINST THE UNITED STATES NUCLEAR REGULATORY COMMISSION

WHEREAS:

1. Crownpoint Chapter is a certified unit of local government and political subdivision of the Navajo Nation having met all of the requirements at 26 N.N.C., Section 03; and codified at 11 N.N.C., Part 1, Section 10; and
2. Pursuant to 26 N.N.C., (B)(1) the Navajo Nation Council delegates to Chapter governmental authority with respect to local matters consistent with Navajo law, including custom and tradition; and
3. Uranium mining has caused widespread devastation of public health, natural resources and cultural values within Diné tah; and
4. The United States Government continues to avoid or delay its responsibility to clean up uranium contamination on Navajo lands, instead, the United States Government, through the United States Nuclear Regulatory Commission ("NRC") devotes resources to approving new uranium development projects on Navajo lands, which will affect Navajo water sources; and
5. In 1998, the NRC approved license SUA-1580, which allows Hydro Resources, Inc. ("HRI") (now NuFuels, Inc.) to mine uranium on four sites in Crownpoint and Churchrock -collectively known as the Crownpoint Uranium Project - using the in situ leach ("ISL") method of uranium recovery; and
6. In its undisturbed state, uranium remains immobile in an aquifer and is confined to small discreet areas and uranium bearing aquifers are commonly safely used drinking water sources; and
7. ISL mining recovers uranium by injecting chemicals into an aquifer to react with immobile uranium deposits, causing uranium and other toxic heavy metals to spread through large areas of the aquifer; and
8. During ISL mining operations, highly contaminated water regularly migrates beyond the mine site; and
9. Transporting yellowcake from ISL mines creates a risk to communities along transportation routes; and

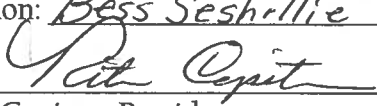
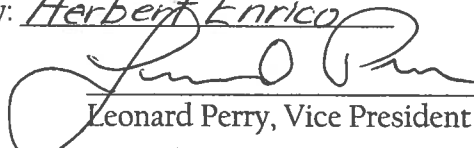
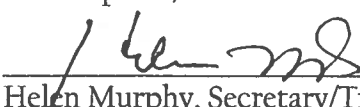
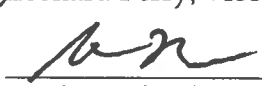
10. HRI/NuFuels seeks to mine uranium in the Westwater Canyon aquifer, which contains high quality water in Churchrock and is the sole source drinking water aquifer for Crownpoint; and
11. At the time the NRC approved the HRI/NuFuels license, no ISL uranium mine had ever restored a mined aquifer to pre-mining quality; and
12. Since 1998, when the NRC approved SUA-1580, no commercial ISL mine has been able to restore contaminated aquifers to pre-mining conditions; and
13. Widespread radioactive and heavy metal contamination from ISL mining makes aquifers unsuitable for drinking water sources, agricultural use, or for cultural purposes; and
14. ISL uranium mines also cause radioactive air emissions, leaks and spills of radioactive and toxic liquids, and displacement of individuals and communities; and
15. ISL uranium mining's deleterious effects last for thousands of years, putting future generations of Diné at risk.

NOW, THEREFORE, BE IT RESOLVED:

1. Crownpoint Chapter supports Eastern Navajo Diné Against Uranium Mining's Petition to the Inter-American Commission on Human Rights in Case 14.544, seeking redress for human rights violations perpetrated by the United States related to its approval of the Crownpoint Uranium Project;
2. Crownpoint Chapter urges the Inter-American Commission on Human Rights to find that the United States has breached its obligations under the American Declaration on the Rights and Duties of Man to protect the life, health, property, religion and culture of the Crownpoint and Churchrock communities;
3. That the United States immediately rescinds SUA-1580.

C-E-R-T-I-F-I-C-A-T-I-O-N

WE, HEREBY CERTIFY, THAT THE FOREGOING RESOLUTION was duly considered by the Crownpoint Chapter (Navajo Chapter) New Mexico, Stated of New Mexico-McKinley County at a duly called Regular Chapter Meeting, at which a quorum was present and that the same was passed by a vote of 8 in Favor, 0 Opposed, 4 Abstained on the 17th day of August, 2021.

Motion: Bess Seshillie Second by: Herbert Enrico

Rita Capitan, President

Leonard Perry, Vice President

Helen Murphy, Secretary/Treasurer

Mark Freeland, Council Delegate

Larry J. King, President
Dr. Carolene Whitman, Vice President
Francine Smith, Secretary/Treasurer

VACANT,
Community Service Coordinator



CHURCHROCK CHAPTER

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churchrock@navajochapters.org

Edmund Yazzie, Council Delegate
Barbara O'Keefe, LDA
Emery Chee, Land Board Member

VACANT,
Account Maintenance Specialist

RESOLUTION NO: CRC-08-2021-011

**SUPPORTING EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S
ALLEGATIONS OF HUMAN RIGHTS VIOLATIONS AGAINST THE UNITED
STATES NUCLEAR REGULATORY COMMISSION**

WHEREAS:

1. Churchrock Chapter is a certified unit of local government and political subdivision of the Navajo Nation having met all of the requirements at 26 N.N.C., Section 03; and codified at 11 N.N.C., Part 1, Section 10; and
2. Pursuant to 26 N.N.C., (B)(1) the Navajo Nation Council delegates to Chapter governmental authority with respect to local matters consistent with Navajo law, including custom and tradition; and
3. Uranium mining has caused widespread devastation of public health, natural resources and cultural values within Dinétah;
4. The United States Government continues to avoid or delay its responsibility to clean up uranium contamination on Navajo lands;
5. Instead, the United States Government, through the United States Nuclear Regulatory Commission ("NRC") devotes resources to approving new uranium development projects on Navajo lands, which will affect Navajo water sources;
6. In 1998, the NRC approved license SUA-1580, which allows Hydro Resources, Inc. ("HRI") (now NuFuels, Inc.) to mine uranium on four sites in Crownpoint and Churchrock – collectively known as the Crownpoint Uranium Project - using the *in situ* leach ("ISL") method of uranium recovery;
7. In its undisturbed state, uranium remains immobile in an aquifer and is confined to small discreet areas;
8. Uranium bearing aquifers are commonly safely used drinking water sources;
9. ISL mining recovers uranium by injecting chemicals into an aquifer to react with immobile uranium deposits, causing uranium and other toxic heavy metals to spread through large areas of the aquifer;
10. During ISL mining operations highly contaminated water regularly migrates beyond the mine site;
11. Transporting yellowcake from ISL mines creates a risk to communities along transportation routes;
12. HRI/NuFuels seeks to mine uranium in the Westwater Canyon aquifer, which contains high quality water in Churchrock and is the sole source drinking water aquifer for Crownpoint;

13. At the time the NRC approved the HRI/NuFuels license, no ISL uranium mine had ever restored a mined aquifer to pre-mining quality;
14. Since 1998, when the NRC approved SUA-1580, no commercial ISL mine has been able to restore contaminated aquifers to pre-mining condition;
15. Widespread radioactive and heavy metal contamination from ISL mining makes aquifers unsuitable for drinking water sources, agricultural use, or for cultural purposes;
16. ISL uranium mines also cause radioactive air emissions, leaks and spills of radioactive and toxic liquids, and displacement of individuals and communities;
17. ISL uranium mining's deleterious effects last for thousands of years, putting future generations of Diné at risk.


NOW THEREFORE, BE IT RESOLVED THAT:

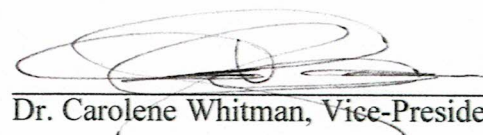
1. Churchrock Chapter supports Eastern Navajo Diné Against Uranium Mining's Petition to the Inter-American Commission on Human Rights in Case 14.544, seeking redress for human rights violations perpetrated by the United States related to its approval of the Crownpoint Uranium Project;
2. Churchrock Chapter urges the Inter-American Commission on Human Rights to find that the United States has breached its obligations under the American Declaration on the Rights and Duties of Man to protect the life, health, property, religion and culture of the Crownpoint and Churchrock communities;
3. That the United States immediately rescind SUA-1580.

C E R T I F I C A T I O N

We hereby certify the foregoing resolution was duly considered by the Churchrock Chapter of the Navajo Nation (New Mexico) at a duly called meeting at which a quorum was present and the same was passed by a vote of 20 in favor, and 0 opposed, and 14 abstained on this 18th day of August 2021.

Motion: Ellen Caruso Second: Janice Yazzie


Larry King, President


Dr. Carolene Whitman, Vice-President


Francine Smith, Secretary-Treasurer



The Navajo Nation Becenti Chapter
T'oo'di'tsin (Barren of the trees) J'adi'hadi't'iih (Antelope lookout)



Jonathan Perry PRESIDENT	Marjorie Lantana VICE-PRESIDENT	Arlene A. Arthur SECRETARY/TREASURER	Mikelle Lantana LAND BOARD	Mark Freeland COUNCIL DELEGATE	VACANT CHAPTER CSC	VACANT CHAPTER AMS
P.O. Box 708, Crownpoint, NM 87313 Phone: (505) 786-2283 Fax: (505) 786-2285 Email: becenti@navajochapters.org Website: becenti.navajochapter.org						

Resolution of Becenti Chapter

BCSEP-21-120

RESOLUTION SUPPORTING THE EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S ALLEGATIONS OF HUMAN RIGHTS VIOLATIONS AGAINST UNITED STATES NUCLEAR REGULATORY COMMISSION.

WHEREAS:

1. Pursuant to Navajo Nation Council Resolution CJY-20-55, the Becenti Chapter is a certified chapter of the Navajo Nation Government and is vested with certain authorities to address and resolve local matters in the best interest of the community members, and coordinate with or refer appropriate subject matters to the Navajo Nation, McKinley County, State of New Mexico, and the US Federal Governments; and
2. Pursuant to Navajo Nation Council Resolution CAP-34-98 Local Governance Act "LGA", allows chapter governments to make decisions over local matters, this authority in the long run, will improve community decision making, allow communities to excel and flourish, enable Navajo leaders to lead towards a prosperous future, and improve the strength and sovereignty of the Navajo Nation; and
3. Pursuant to the Navajo Treaty of Bosque Redondo of 1868 that was signed on June 1, 1868, ratified on July 25, 1868, and officially proclaimed on August 12, 1868, the Navajo Nation and the United States Government entered into a permanent peace agreement in which certain rights and responsibilities were granted to each party, of that the United States Government were given trust responsibility; and
4. Pursuant to Article I of Navajo Treaty of Bosque Redondo of 1868, which states, if bad men among the whites, or among other people subject to the authority of the United States, shall commit any wrong upon the person or property of the Indians, the United States will, upon proof made to the agent and forwarded to the Commissioner of Indian Affairs at Washington city, proceed at once to cause the offender to be arrested and punished according to the laws of the United States, and also to reimburse the injured persons for the loss sustained; and
5. Eastern Navajo Diné Against Uranium Mining (ENDAUM) is a Navajo-led grassroots organization based within communities within several Navajo communities in Eastern Navajo Agency of the Navajo Nation with the mission to protect the purity of the water, air, lands, and community health in areas impacted by uranium activities for the present and future generations. ENDAUM works to empower our communities through

education and sustainability to protect and respect the foundations of our Diné way of life; and

6. Pursuant Public Law 93-438 enacted by the United States Government on October 11, 1974, the Nuclear Regulatory Commission (NRC) was officially established and codified at 42 United States Code Annotated (U.S.C.A.) §5801; and
7. The NRC has oversight to grant licensing and related regulatory functions pursuant to 42 USCA §5842, and of which uranium extraction/mining projects are considered and approved by the NRC, that includes projects on and near the Navajo Nation; and
8. On January 5, 1998, Hydro-Resources Inc. (HRI), now NuFuels, approved Material License SUA-1508, which grants HRI/NuFuels to begin operation of the Crownpoint Uranium Project using the *In Situ* Leach mining method within four (4) primary locations within aquifers located within the Diné communities of Crownpoint and Churchrock, New Mexico; and
9. Pursuant to Material License SUA-1508 Section 10.4, the Dakota Sandstone, Westerwater Canyon, and Cow Springs local aquifers are identified to be used for the Crownpoint Uranium Project with use of injection wells with the intention of injecting chemicals to react with immobile uranium deposits that will cause those said uranium deposits and other harmful heavy metals to become mobile and spread which will have potential to pollute the said aquifers in various locations within the Eastern Navajo Agency; and
10. To date there have been various independent analyses and studies completed that all have concluded that *In Situ* Leach mining intentionally contaminates water sources and cannot be restored to pre-mining quality; and
11. Laramide Resources, Ltd. purchased HRI properties located within the Crownpoint and Churchrock communities that were identified in Material License SUA-1508, and took over the "Crownpoint Uranium Project", in that action NuFuels, a subsidiary of Laramide Resources, Ltd., is continuing to initiate the *In Situ* Leach mining project; and
12. Pursuant to Resolution NTUA-11-97 of the Management Board of the Navajo Tribal Utility Authority (NTUA) of the Navajo Nation, there are two (2) primary operating wells within the area of the local aquifer that serves over ten thousand (10,000) residents in several Diné communities, and therefore opposes the "Crownpoint Uranium Project" due to the overwhelming threat of contamination from *In Situ* Leach Mining, states the NRC is inadequate and unresponsive to the needs of NTUA with respect to the water supply, maintaining existing high quality water supply, and future water quality and quantity concerns; and
13. The Navajo Nation has a long history of contamination issues from past uranium mining that took place when the mid-1940's through the mid-1980's across various regions with Arizona, New Mexico, and Utah that have resulted in health issues, environmental and natural resources damage, economic loss, and negative impacts on Diné Culture; and

14. Becenti Chapter opposes new uranium mining projects, both *In situ* Leach and Conventional methods in any areas on or near the Navajo Nation, and the use of aquifers within the region that Diné communities utilize.
15. Becenti Chapter is greatly concerned with the "Crownpoint Uranium Project", and the lasting impacts that can result from such operations, as the entire region that the Becenti Chapter community is located in is experiencing severe drought and the preservation of aquifers in the area is crucial for the future of the area.

NOW, THEREFORE, LET IT BE RESOLVED THAT:

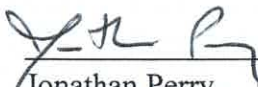
1. Becenti Chapter fully supports the Eastern Navajo Diné Against Uranium Mining's allegations of human rights violations of the United States Nuclear Regulatory Commission as stated in their petition to the Inter-American Commission on Human Rights in Case 14.544.
2. Becenti Chapter urges the Inter-American Commission on Human Rights to find that the United States has breached its obligations under the American Declaration on the Rights and Duties of Man to protect the life, health, property and culture of the Crownpoint and Churchrock communities.
3. Becenti Chapter urges that the Nuclear Regulatory Commission rescind Material License SUA-1508 immediately.

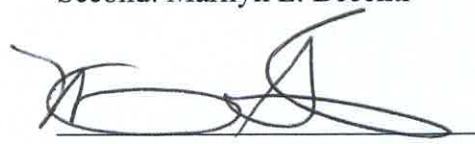
CERTIFICATION

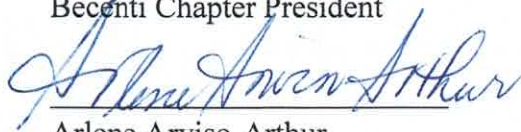
WE HEREBY CERTIFY, that this foregoing resolution was duly considered by the Becenti Chapter at a duly called chapter meeting at Becenti Chapter, at which a legal quorum was present and the same was passed by a vote of 22 in favor, 0 in opposition, and 2 abstaining on this 21st day of September 2021.

Motion: Arlene Arviso-Arthur

Second: Marilyn L. Becenti


Jonathan Perry,
Becenti Chapter President


Marjorie Lantana,
Becenti Chapter Vice-President


Arlene Arviso-Arthur
Becenti Chapter Secretary/Treasurer

Mark Freeland,
Navajo Nation Council Delegate



RESOLUTION
OF THE
IYNABITO CHAPTER
THE NAVAJO NATION

No. ICH67 09/021-070

A SUPPORTING RESOLUTION – “SUPPORTING EASTERN NAVAJO DINE AGAINST URANIUM MINING’S ALLEGATIONS OF HUMAN RIGHTS VIOLATIONS AGAINST THE UNITED STATES NUCLEAR REGULATORY COMMISSION.”

WHEREAS:

1. Pursuant to Navajo Tribal Council Resolution W-30-55, and reaffirmed by Resolution CMY-23-79, the Council certifies and authorizes the Iyanbito Chapter as a Navajo Chapter; and
2. Pursuant to 26 N.N.C., Section 1, (B)(1)(2) and Section 103, the Iyanbito Chapter is recognized as a local government entity and delegated certain authorities and responsibilities with respect to local matters consistent with Navajo Nation laws; and
3. Uranium mining has caused widespread devastation of public health, natural resources and cultural values within Dinéah;
4. The United States Government continues to avoid or delay its responsibility to clean up uranium contamination on Navajo lands;
5. Instead, the United States Government, through the United States Nuclear Regulatory Commission (“NRC”) devotes resources to approving new uranium development projects on Navajo lands, which will affect Navajo water sources;
6. In 1998, the NRC approved license SUA-1580, which allows Hydro Resources, Inc. (“HRI”) (now NuFuels, Inc.) to mine uranium on four sites in Crownpoint and Churchrock – collectively known as the Crownpoint Uranium Project - using the *in situ* leach (“ISL”) method of uranium recovery;
7. In its undisturbed state, uranium remains immobile in an aquifer and is confined to small discrete areas;
8. Uranium bearing aquifers are commonly safely used drinking water sources;
9. ISL mining recovers uranium by injecting chemicals into an aquifer to react with immobile uranium deposits, causing uranium and other toxic heavy metals to spread through large areas of the aquifer;
10. During ISL mining operations highly contaminated water regularly migrates beyond the mine site;
11. Transporting yellowcake from ISL mines creates a risk to communities along transportation routes;
12. HRI/NuFuels seeks to mine uranium in the Westwater Canyon aquifer, which contains high quality water in Churchrock and is the sole source drinking water aquifer for Crownpoint;
13. At the time the NRC approved the HRI/NuFuels license, no ISL uranium mine had ever restored a mined aquifer to pre-mining quality;
14. Since 1998, when the NRC approved SUA-1580, no commercial ISL mine has been able to restore contaminated aquifers to pre-mining condition;
15. Widespread radioactive and heavy metal contamination from ISL mining makes aquifers unsuitable for drinking water sources, agricultural use, or for cultural purposes;

16. ISL uranium mines also cause radioactive air emissions, leaks and spills of radioactive and toxic liquids, and displacement of individuals and communities;
17. ISL uranium mining's deleterious effects last for thousands of years, putting future generations of Diné at risk.

NOW THEREFORE BE IT RESOLVED THAT:


1. The Iyanbito Chapter supports Eastern Navajo Diné Against Uranium Mining's Petition to the Inter-American Commission on Human Rights in Case 14.544, seeking redress for human rights violations perpetrated by the United States related to its approval of the Crownpoint Uranium Project;
2. The Iyanbito Chapter urges the Inter-American Commission on Human Rights to find that the United States has breached its obligations under the American Declaration on the Rights and Duties of Man to protect the life, health, property, religion and culture of the Crownpoint and Churchrock communities;
3. That the United States immediately rescind SUA-1580.

CERTIFICATION

We hereby certify the foregoing resolution was duly considered by the Iyanbito Chapter at a duly called Regular Chapter meeting at Iyanbito, Navajo Nation, New Mexico, at which a quorum was present and that the same was passed by a vote of 18 in favor, 00 opposed, and 01 abstained, this 28TH day of September 2021.

Motion by: Selma Chee

Second by: Alonzo-Thomas Becenti


Seneca Becenti, President
Jay Chee, Vice-President
Stephen Silversmith, Secretary/Treasurer



RESOLUTION
OF THE
EASTERN NAVAJO AGENCY COUNCIL
THE NAVAJO NATION

No. ENAC-08/2021-044

**SUPPORTING EASTERN NAVAJO DINÉ AGAINST URANIUM MINING'S ALLEGATIONS OF HUMAN RIGHTS VIOLATIONS
AGAINST THE UNITED STATES NUCLEAR REGULATORY COMMISSION**

WHEREAS:

1. The Eastern Navajo Agency Council (ENAC) is established under the Legislative Branch of the Navajo Nation and certified by Resolution IGRS-251-01; and
2. Pursuant to 26 N.N.C. Section 103 (D) (4), the Eastern Navajo Agency Council, a consortium of elected Chapter Officials representing thirty-one (31) certified Navajo Nation Chapters agree to address and undertake common goals and interests for the benefit of the Eastern Navajo Agency Chapters; and
3. Pursuant 2 N.N.C. SECTION: 4028; the Eastern Navajo Agency Council is vested with government authority to review all matters affecting the community to make most appropriate recommendations when necessary to the Navajo Nation, County, State, Federal and other local agencies; and
4. Uranium mining has caused widespread devastation of public health, natural resources and cultural values within Diné tah; and
5. The United States Government continues to avoid or delay its responsibility to clean up uranium contamination on Navajo lands, instead, the United States Government, through the United States Nuclear Regulatory Commission ("NRC") devotes resources to approving new uranium development projects on Navajo lands, which will affect Navajo water sources; and
6. In 1998, the NRC approved license SUA-1580, which allows Hydro Resources, Inc. ("HRI") (now NuFuels, Inc.) to mine uranium on four sites in Crownpoint and Churchrock -collectively known as the Crownpoint Uranium Project - using the in situ leach ("ISL") method of uranium recovery; and
7. In its undisturbed state, uranium remains immobile in an aquifer and is confined to small discreet areas and uranium bearing aquifers are commonly safely used drinking water sources; and
8. ISL mining recovers uranium by injecting chemicals into an aquifer to react with immobile uranium deposits, causing uranium and other toxic heavy metals to spread through large areas of the aquifer; and
9. During ISL mining operations, highly contaminated water regularly migrates beyond the mine site; and
10. Transporting yellowcake from ISL mines creates a risk to communities along transportation routes; and
11. HRI/NuFuels seeks to mine uranium in the Westwater Canyon aquifer, which contains high quality water in Churchrock and is the sole source drinking water aquifer for Crownpoint; and
12. At the time the NRC approved the HRI/NuFuels license, no ISL uranium mine had ever restored a mined aquifer to pre-mining quality; and
13. Since 1998, when the NRC approved SUA-1580, no commercial ISL mine has been able to restore contaminated aquifers to pre-mining conditions; and
14. Widespread radioactive and heavy metal contamination from ISL mining makes aquifers unsuitable for drinking water sources, agricultural use, or for cultural purposes; and
15. ISL uranium mines also cause radioactive air emissions, leaks and spills of radioactive and toxic liquids, and displacement of individuals and communities; and
16. ISL uranium mining's deleterious effects last for thousands of years, putting future generations of Diné at risk.

NOW, THEREFORE BE IT RESOLVED THAT:

1. The Eastern Navajo Agency Council hereby supports Eastern Navajo Diné Against Uranium Mining's Petition to the Inter-American Commission on Human Rights in Case 14.544, seeking redress for human rights violations perpetrated by the United States related to its approval of the Crownpoint Uranium Project.
2. **FURTHER BE IT RESOLVED** the Eastern Navajo Agency Council hereby urges the Inter-American Commission on Human Rights to find that the United States has breached its obligations under the American Declaration on the Rights and Duties of Man to protect the life, health, property, religion and culture of the Crownpoint and Churchrock communities.
3. **FURTHER BE IT RESOLVED** that the United States immediately rescinds SUA-1590.

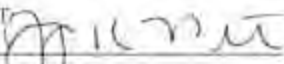
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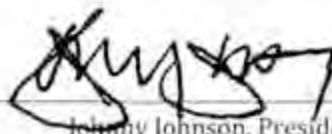
I hereby certify that the foregoing resolution was approved by the Eastern Navajo Agency Council at a duly called meeting via Teleconference, at which a quorum was present and the same was passed by a vote of 67 in favor, 0 opposed, 2 abstained, this 05th day of June 2021.

Motion: Thomas Barbone

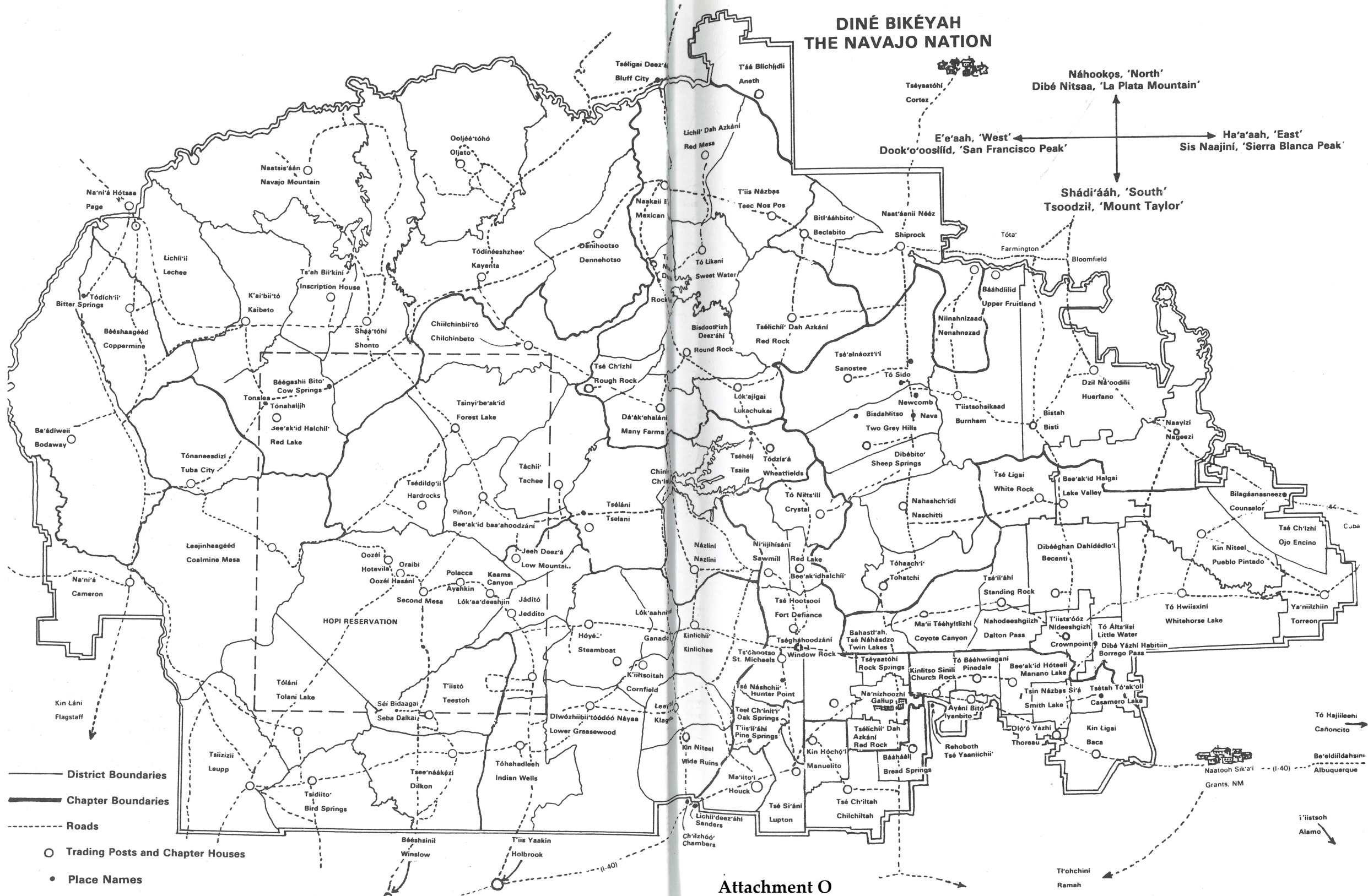
Second: Cecil Lewis

ATTEST


Judy Platero, Secretary


Johnny Johnson, President

DINÉ BIKÉYAH
THE NAVAJO NATION



Attachment O

***NAVAJO COMMUNITIES OF CROWNPOINT AND CHURCHROCK
V.
THE UNITED STATES OF AMERICA***

Case No. 14.544

Video Excerpts of Testimony

The 9-minute video, entitled, "IACHR Video Testimony Clips ENDAUM," can be viewed with the following link:

<https://drive.google.com/file/d/1EpFMNq2NGYZz1L0W-n-5iq40W2b29oEw/view>

TRT: 00:09:05:00

Video format: .mp4

Recorded during the month of September 2021 in Crownpoint, Churchrock and Becenti, Navajo Nation, New Mexico, United States.

Testimony of Petitioners:

Rita Capitan

Mitchell Capitan

Christine Smith

Larry King

Jonathan Perry